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CHICAGO, NOVEMBER 1912.

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A SERIES ON RATES.

RATES is the most interesting subject pertaining to telephony or any other public utility service. Also it is the most difficult subject and the most intricate. Telephone rate causes have never yet been satisfactorily analyzed, although each case of readjustment undertaken by experts brings us a step nearer to a scientific basis.

The series of articles entitled "Rates in Cities of Over 10,000 Population," the first of which appears in this issue, does not pretend to solve the problem of correct rates. It merely reveals, for comparative purposes, the existing rates in 125 cities ranging in size from 10,320 to 687,029 population.

Measured rates really simplify telephone service by making it equitable; but they certainly complicate a tabulation. Indeed, it would be practically impossible to list these same cities with all their flat and measured rates within the physical limits of our page size. Furthermore, measured rates do not compare with flat rates without a vast amount of figuring on traffic—number of outgoing calls, etc. So the tabulation in this number gives only flat rates. The cities are arranged according to population, starting with the largest and grading down. For comparative purposes this arrangement is more convenient than the usual alphabetical listing, as neighboring units in the list are always of similar size.

So flexible are the conditions of telephone service, however, that in order to understand some of the figures the article preceding the table must be read carefully. As an example, near the bottom of the list will be found Wakefield, Mass., with a rate seemingly out of proportion to its size when compared to its tabular neighbors. The article explains, however, that Wakefield service includes the "Wakefield district," with a much larger population. The same condition obtains in some other territories, as explained.

Competitive conditions are shown in fifty of the cities listed. In some of the others competition may exist, but not be shown, because of incomplete information. This would indicate that in cities of the class included in the list, over forty per cent have dual service. In most cases the independent rates are lower than the Bell—and presumably too low for profit. Sometimes both rates are the same, especially where regulated by ordinance. In only one of the cities listed—Butte, Mont.—is the independent rate the highest. In the aggregate, the rates in non-competitive cities are preceptibly higher, although that condition is not uniform by any means. Indianapolis, Ind., with competition, has about the lowest rate in proportion to its size and telephonic development, averaging lower than Great Falls, Mont., also with competition and with only one-sixteenth the population.

A great many of the cities whose flat rates are given also have measured service, at the option of the sub-

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My commission expires Aug. 17, 1914.

scriber. Others have flat rates on single lines and only measured service on party lines. Still others have flat rate business service and measured residence service.

Theoretically, service at so much per call should result in the same rates for all communities, regardless of population, exchanges in the larger cities being so distributed that individual lines are no longer than in smaller cities. We shall see how this works out in practice in number two of the series next month.

INTANGIBLE VALUES.

APPRAISALS of public utility properties must naturally take cognizance of those development costs which, while not appearing in the physical property, nevertheless represent actual necessary investment. These make up what are called the intangible values of the property, and include such items as franchise costs, going value, interest on investment while building the plant, etc. All these items are just beginning to receive proper attention. A factor which, however, has been somewhat neglected, is discount on bonds. This subject was treated interestingly by William J. Hagenah recently in a talk before the Northwest Electric Light and Power Association at Portland, Oregon. Mr. Hagenah was formerly statistician for the Wisconsin Utility Commission, acted as expert in a Chicago telephone rate investigation, and is thoroughly familiar with the intricacies of public utility appraisals. His views on the subject follow:

> Another item of cost which the analysis of a construction account frequently reveals is the discount on bonds issued. Such discounts are incurred not only on the original issue of bonds, but on nearly every subsequent issue, although to a gradually diminishing extent as the business becomes more strongly established. Under ordinary conditions the element of discount is inseparably connected with the rate of interest which the bonds carry, but on the organization of the company the cause of the discount is not so much a question of the rate allowed as it is one of security for the principal, making the discount very large, with the result that the bonds, instead of being strictly an investment security, become in fact a highly speculative issue. Not to pay the price for funds as indicated by the discount required at that time frequently results in denying to the community the benefits of the service which it is sought to supply, and it is a question whether the value of obtaining the service at the time should not be considered in connection with the necessity and reasonableness of the discount which was one of the costs of securing it.
>
> Where a utility is soon able to show favorable net earnings the problem of discount on bonds is a simple one. It is where there are no net earnings that the discount must be considered as a cost. Regarded in this light it is a comparatively small burden to the future users of the property, but to make an early amortization of the discount would be to throw the entire burden of securing a permanent industry still in the speculative stage on the early patrons of the property.
>
> Aside from the academic rule of accounting that the discount on securities should be amortized over the life of the bonds, the situation which actually confronts the community desiring a plant is a specific condition and not a theory. To the old-established company whose history of operation has been one of gradually increasing profits and with a long sustained dividend record the question of discount on bonds is not so vital in the cost of property as it is with the newer plant. Neither is the present-day discount of an established utility conclusive as to the method to be used in disposing of such costs. Present discounts represent the success of the business at this time as managed by the present organization in the community as it exists today. The discounts incurred in the organization and construction of the plant are a gauge of the cost of the property when the venture was undertaken and of the confidence with which the community then regarded it. Here, unlike the case of a private enterprise, the city probably had the right to engage in the business itself, just as many did engage in the construction and operation of water and lighting plants. The city may have questioned the success of the industry or its ability to operate it efficiently and considered the risks as outweighing the advantages of ownership. Therefore, after having stood by while others have incurred the risks which the community refused to assume, it should not be permitted now to ignore the costs which could not be avoided in developing the industry, especially if the city itself could not have engaged in the enterprise without meeting the same discounts unless it had pledged a greater security than was provided by the property of the company.
>
> Unquestionably all legitimate costs incurred in establishing a public utility should be recognized as going to make up the operative property. Rate-regulating commissions cannot ignore any item of expense whose avoidance might have prevented or delayed the establishment of the service on an economical basis.

MUNICIPAL OWNERSHIP OF TELEPHONES—

CLEVELAND, Ohio, is experiencing the excitement of an agitation for municipal ownership of telephones. The city council passed a resolution the last day of September directing the mayor and the director of public works to investigate and report on the advisability of such a move. Mayor Baker accepted the assignment with apparent enthusiasm. He immediately discerned three paths leading the city to the telephone business: To acquire and consolidate Cleveland's two companies; to acquire one company and fight the other; to build a new company and fight both the old ones.

The mayor favors the plan of acquisition as providing the easiest path. A former engineer of the independent company likes the idea of new construction as providing the most work, and is arguing along those lines. It may be presumed that the sane business men and taxpayers of Cleveland do not like any of the plans, least of all that of adding a third system.

Upon the purely local aspects of the sithation *Finance*, published in Cleveland, has this to say:

> The city of Cleveland would have extreme difficulty in selling bonds for the purpose of the building of a telephone plant, or for the purchase of a telephone plant, inasmuch as the credit of the city of Cleveland would not be pledged for the payment of either the principal or the interest on these bonds, but that the bondholders would have to look only to the revenues of the property, and the property itself for their principal and interest. Now if the city of Cleveland were to negotiate a deal for the Cuyahoga and Bell Telephone Companies and were to

grant the consolidated company an extremely favorable franchise and mortgage both the property and the franchise, it could probably sell the bonds necessary to purchase the consolidated company, and put the deal through, but there is no banking house in this country, no group of capitalists or individual capitalist who would advance to the city of Cleveland the money necessary to build a competing telephone system in Cleveland upon bonds secured only upon the competing plant, and there is no banking house in this country, or group of capitalists or individual capitalist, who would advance the money necessary to buy the Cuyahoga Telephone Company or the Bell Telephone Company, upon bonds secured only by the earnings and property of either one of these companies, provided it was the intention of the city of Cleveland to buy one property and to use that property to compete with the other property.

We believe, therefore, we are justified in saying that the only way for Cleveland under the recently acquired authority to give us municipal ownership in Cleveland is to buy both the Bell and Cuyahoga plants and the easiest way for Cleveland to bring this about is to secure the consolidation of these two companies before any attempt is made to acquire them for municipal ownership.

Do any of our readers believe that any bonds can be sold to build a telephone plant in Cleveland, where the aggregate amount of bonds must equal the total cost of the plant and where that plant would immediately be plunged into a war with so powerful a competitor as the American Telephone and Telegraph Company? You could not sell bonds on a 12 per cent basis on such a proposition as this, and if you please, does any one believe that bonds could be sold to purchase the equity in the Cuyahoga Telephone Company, with the understanding that the company was to at once enter into vigorous competition with the Bell Telephone Company?

The most important obstacle to municipal operation of a telephone system, however, is that its success is not possible in this country. This may appear rather an arbitrary statement. It cannot, indeed, be demonstrated mathematically, but it is logical nevertheless. Telephone operating is far more complex than gas, electric or water plant operating; yet what city can point to an efficient record in any of these? The remarkable telephonic development of the United States as compared to any other part of the world is due wholly to the private ownership of American systems and the municipal or state ownership of European telephones.

In no line of employment does personal ambition and loyalty count for more in the success of the employer than in the business of telephone operating. In no line of employment does personal ambition and loyalty count for so little as under the civil service rules of municipality or state.

As to operating conditions, there is little difference between state and municipal ownership. Some remarks by Sydney Brooks in *Harper's Weekly* under the heading "The Telephone and the State" are interesting as showing the conditions in Europe because of the policy of state ownership prevailing there:

> Not only are there far fewer telephones in Europe than in America, but those that exist are, as a rule, almost ludicrously inferior in quality. There are great and famous towns in Europe at this moment where a plant and apparatus of the kind that went to the scrap heap in America twenty years ago still obtain, where the obsolete magneto system, long ago abandoned in the United States for the central battery, is still adhered to, where the old flat-rate scheme of tariffs is still the rule, and where the single exchange districts, with relatively high rates for distant parts of the town, still holds the field, while throughout the length and breadth of England and the Continent there is hardly a single efficient long-distance service to be found.
>
> Now what is the explanation of this extraordinary contrast? I do not think any one who has looked into the question can avoid the conclusion that the main reason for the all-round superiority of the telephone in America over its counterpart in Europe is that in America the telephone industry has been left free to expand in its own way and without official restrictions, while in Europe it has been in most countries a state monopoly. Both policies have their advantages and both their disadvantages. The United States, by permitting free competition in telephones, has suffered more than a little from the collision of rival companies and by the growth in some parts of the country of two or more systems, each supplying the same locality but refusing to one another any co-operation of facilities; and now that the laws of economic consolidation, greatly as I believe to the advantage of the public, have brushed aside the confusion of earlier days and have resulted in bringing most of the telephone business of the country under a single, unified control, the government necessarily finds itself confronted with a huge corporation which practically monopolizes a great public utility. In Europe, on the other hand, these difficulties have been largely avoided by making the telephone from the first a state enterprise; but they have been avoided, as we have seen, at the cost of furnishing the public with a meager, exasperating and totally inadequate and unprogressive service.
>
> On the whole I have not much doubt as to which side the balance of advantage inclines. The more, indeed, one inquires into the history of telephone development in Europe the more convinced does one become that, while a monopoly in private hands is often objectionable, it may be ten times more objectionable in the hands of the state, and that, while a country may incur some political risks if a public utility is left under corporate control, it suffers far more if the same utility is furnished by the state in an inefficient and unenterprising form. A well run, privately owned monopoly is of greater benefit to the people than the same monopoly badly run and owned and operated by the state. It is always easier to bring a privately managed utility under the proper supervision of the government than it is to raise a state department to the ordinary corporation level of business ability.
>
> In countries where the telephone has not been made a government monopoly the system of issuing limited licenses, terminable at the end of a fixed and usually too brief period and under indefinite conditions as to the repayment of capital, has had the effect of hindering the flow of private investment; and even in countries where the telephone has been taken over by the state the governments have shrunk from putting the necessary money into the business. All the European states lose money on the workings of the telegraphs, and they have no desire to incur further deficits in connection with the telephones. But if the American companies had been afraid to pour out money without any immediate return, if they had neglected to adopt new improvements even at the cost of rebuilding their entire plant, America would not today enjoy the best telephone service in the world. In almost every country where the telephone is a government monopoly you will find that it has not been carried beyond the tentative and experimental phase that America left behind two decades ago. More rigid and with less initiative than private companies, hampered by political considerations, unwilling to concentrate responsibility, less disciplined and less elastic in their organizations, the governments of Europe, with perhaps two exceptions, have made their administration of the telephones a synonym for all that is wasteful and incompetent.

It is not likely that the city of Cleveland will commit such a *faux pas* as to attempt to operate a telephone system. If it does, however, we will doubtless be provided with an interesting object lesson in municipal ownership of telephones—a branch which has been somewhat neglected south of the Canadian line.

IMPORTANCE OF TELEPHONE COURTESY

As the telephone is essential to the conduct of modern business, courtesy via telephone, by the trade to its customers, is most important. The *Saturday Evening Post* has the following to say on the subject:

The house that tolerates operators who annoy telephone inquirers by curtness, by long delays, by snappy or impatient replies, loses business—and loses it heavily. And this not only applies to telephone operators, but to any clerk, salesman, or other employee who may be called to the telephone to answer questions.

So important is this considered, that one house gives each of its employees a printed slip, which reads as follows: "In talking over the telephone, the tone of your voice will make either a friend or an enemy

for us! If you are talking with a customer face to face, and let impatience get into your voice, he may overlook it because he sees by your face that you really mean to be courteous; but if you let the slightest touch of impatience or irritability get into your voice when talking over the telephone you are sure to lose for the house."

Another important house, one of the growing number whose heads keep in personal touch with their employees in general matters of policy and behavior, urges against the tendency to undue haste that comes from the possible swiftness of doing business by telephone. "Be sure to take plenty of time to make your position understood, and especially if you are telling a man that you can not meet his views or his proposition," is one of the rules of this house; and another rule is that, whenever an order is taken, not only must "Thank you!" be said, but it must be said as if it is really meant, and not perfunctorily. "The telephone is a time saver," is the summing up of this house; "but we must not lose a customer in saving time. Never be too hasty."

One of the great houses—one of national reputation—announces that it can be reached by telephone "at any hour of the day or night!" Now, it isn't at all likely that you will want to call up the store at, say, 3 o'clock in the morning; but it gives a customer a rather pleasant feeling to know that there is always somebody on hand to attend to his wants if, for any reason—for example, because of being suddenly called away from home—he may wish to talk with the store at night or on a holiday in regard, perhaps, to clothes or other necessities for the trip. Systems that develop courtesies like this make great establishments.

One of the largest clothing stores has adopted a system by which the telephone is steadily used as a means of combined business and courtesy. Each clerk is given a notebook, in which he must keep a record of his customers—such customers as he considers to be his in the sense well understood in every store; and this record must show, in particular, the kinds of goods each of his customers specially likes, and also the articles desired which the customer has been unable to find precisely, and on that account has failed to make a purchase. When anything comes in that a customer likes, and especially when it seems to be the very thing he wanted but could not find, the clerk must take advantage of a lull in business to call him up by telephone and inform him of the arrival of the goods. That store finds this system has materially increased sales. It is not as if customers were called up at random, for that would be very annoying; but they are called up to be told something that ought specially to interest them—and telephoning is far better than to write notes or to send circulars, because it gives the sense of personal care and thought and attention. Customers are universally sensitive about being nagged or pestered, as they would term it; but this house finds that telephoning, done briefly in a polite way, makes a good impression when it is definitely done in regard to a customer's definite wants.

Successful experiments have been carried out by the British Post Office in telephoning from London to Amsterdam and Arnheim.

A Lot of Loaded Lines

Exchange-a-Line.

Gone is the forest primeval, the murmuring pines and hemlocks,
Strip'd of their bark and their limbs, bear branches of locust and cedar,
Covered with leaves of glass that twinkle and flash in the sunlight,
And bound, the one to the other, with cobwebs of shining metal.
Still sounds the hum and the murmur, but now it has changed its symbol,
And whispers of hearts united, communing across the stretches.
Gone are the long, hard road and the messenger bearing tidings,
Riding the hours away; and gone are the hours of his waiting.
Over the land and the rivers a thin, bright line has extended,
Joining the ends of the earth and bringing the states into audience.
Gone is the dread of strange places; the East and the West are together.
For this is the age of the wire; we have banished the forest primeval.

In the course of a shave the other day we casually mentioned that it had taken two days to wire the house we live in.

"Ain't it the limit?" asked the barber sympathetically. "I have the same trouble every time I try to telephone home. That's what comes of those party lines." Then he told us the following old story, which he illustrated with cuts:

An independent telephone man from Ohio was booked for a speech at the convention banquet. One speaker after another finished and sat down, the hour grew late and the guests began to depart in twos and threes. When there were only a few left the toastmaster said, "Mr. —— will now give us his address." Mr. —— rose slowly to his feet and said:

"Mr. Toastmaster, ladies and gentlemen here assembled: My address is Columbus, Ohio. I bid you all good night."

"THE SECOND POST."

[Letter received at the Ann Arbor Exchange of the Michigan State Telephone Company.]

Mister Keach

Our fone no 518 1 1 & 3 short is outa order it axas tho its hare spring was catched over the transmiter bobin, cause it dont click in your ear when your lisnen and there trin to get you to hang up. I wish it could be fixt I understan in a round a bout way that 2 of our neabors are at outs over a filly. and we are somewhat anxus as to how the mater is fixt up. Yours in haste.

HIS BUG IS PULLING WIRES.

[From the Mountain States Monitor.]

A short time ago, Mr. Edwards, a fitter at the York Exchange, Denver, had to fish some wires through a conduit in order to install a telephone. That conduit was immensely crooked and he was unable to get a steel tape through. He then tried to blow a piece of paper through with a thread tied to it, with a bellows, but in this he failed. On his way back from lunch he was still trying to solve the problem when a large tumble bug crossed his path. Then an idea came to him. He took the bug with him and tied his thread to the bug and started it through the pipe. Whenever the bug got tired and stopped to rest, he would shoot him with a blast from his bellows. This kept the bug moving until he was rewarded by seeing the bug crawl out the other end of the pipe, pulling the thread out with him. The rest was easy.

LIFT YOUR SKIRTS, GIRLS, YOU'RE STEPPING ON A VOLT.

[From the Montgomery News.]

Harmful as electrolysis may be, it is one of the most interesting freaks that develop in the use of electricity. Electricity is measured by volts and amperes, volts denoting the quantity of the current and amperes its quality, or strength. It is possible for volts to escape from a distributing point, from a trolley car in the rain, and in almost any manner where the wiring may be out of order. They may come down the trolley pole of a street car in rainy weather, be picked up on the damp floor in a woman's silk petticoat, left on the metal plate of a store's door, picked up by the steel tire of a vehicle, but invariably they find their way back to the current-generating dynamo. Left awhile on a piece of metal, the stray volts will feed on it, destroying it, the destruction in such circumstances being known as electrolysis. The disease is something that every institution using metal pipes is constantly on guard against, as far as it can guard, but usually, as in the present instance, the damage is not found out until it is done.

On our way to press we learn that Mr. Bemis, Chicago's telephone investigator No. 3, has found that the Chicago Telephone Company is making too much money. Why, it is actually paying dividends to its stockholders!

P. H. W.

Rates in Cities of Over 10,000 Population

1. Unlimited Service

TELEPHONE rates are complicated things. There are flat rates for business telephones on single, two-party and four-party lines; residence telephones on similar lines; measured service on single and party lines with all sorts of provisions for volume of traffic; coin-box service with guarantees of so many calls; private branch exchange service of all grades and conditions; and even, in some cases, special rates for physicians and the clergy. It is quite evident that to present a comprehensible table of all these various rates, each properly classified for purposes of comparison, would be impossible. The simplest way of handling the problem, apparently, is to divide the subject into at least three parts. The first part, obviously, should cover flat rate service. The second part might well be given to the intricacies of measured service, and the third part to private branch exchange service. A fourth part might possibly be necessary to cover the minor points of charges for extensions, "kitchen telephones," moving charges, special rates for desk sets, and the other incidentals which, after all, really form part of the total rate schedule.

This article, therefore, will deal with flat rates in cities of over 10,000 population. The complicated rates of some of the largest cities, however, are omitted, and will be considered in a subsequent article.

For convenience in comparing the rates of cities of approximately the same size, they are tabulated according to population instead of alphabetically. The list is not, of course, complete; but it contains the names of some 135 cities ranging in size from 10,000 to over a half million. The total number of such cities in the United States is a trifle over 300. There are enough in the list to give a good idea of the average rates obtaining in a city of any given size between the two extremes.

It will be observed that the number of subscribers to each system is not given. In some cases the authoritative figure was not available. A small subscription list in a good sized city is the poorest possible excuse for low rates, except where competition exists; and the competitive cities are comparatively few today. The rates indicated are presumably based on a satisfactory service, embracing a reasonable proportion of the population in each case.

There are in many cases deviations from the set schedule prescribed by this tabulation, which could not well be indicated therein. For example, Detroit has a "gross rate" eleven per cent greater than the net rate shown in the table. Thus a ten per cent discount from the gross rate for payment before a specified date gives the net rate. Detroit has also a "physicians' rate" on single line unlimited service, which figures at $50.00 net.

Cincinnati has a flat rate residence service within a radius of two miles of the exchange at $48.00, or $30.00 on a two-party line. The rates tabulated are for a four mile radius. New Orleans has a flat rate single line service for clergymen, etc., of $42.00. The only flat rate service in Washington, D. C., is the one indicated.

Los Angeles' rates are complicated by reason of the fact that the city not long ago absorbed the neighboring cities of San Pedro and Wilmington. This leads to the following sections in the rate ordinance, in addition to the provision for the rates shown in the table:

SEC. 2. That the rates to be charged and collected for telephones, telephone service and telephone connections in the City of Los Angeles, furnished by the San Pedro Home Telephone Company, a corporation, to the City of Los Angeles, or to the inhabitants thereof, for the year commencing July 1, 1912, and ending June 30, 1913, are hereby fixed as follows:

For each telephone installed and maintained in any business office or premises, connected with the central exchange by an independent or individual circuit, with unlimited service, $2.50 per month; for each telephone installed and maintained in any business office or premises, connected with the central exchange by a two-party line circuit, with unlimited service, $2.00 per month; for each telephone installed and maintained in any business office or premises connected with the central exchange by a four-party line circuit, with unlimited service, $1.75 per month; for each telephone installed and maintained in any house or place other than a business office or premises, connected with the central exchange by an independent or individual circuit, with unlimited service, $1.50 per month; for each telephone installed and maintained in any house or place other than a business office or premises, connected with the central exchange by a four-party line circuit, with unlimited service, $1.35 per month; for each telephone installed and maintained in any house or place, other than a business office or premises, connected with the central exchange by an eight-party line circuit, with unlimited service, $1.00 per month; for each extension wall telephone, sixty cents per month; for each extension portable telephone, eighty-five cents per month. The rates fixed by this section shall apply to both wall and portable telephones, except when otherwise in this section particularly designated.

SEC. 3. That the rates to be charged and collected for telephones, telephone service and telephone connections in the City of Los Angeles, furnished by the Pacific Telephone and Telegraph Company to the City of Los Angeles, or to the inhabitants thereof, through the exchange maintained and operated by said company in that portion of said city, formerly included within the corporate limits of the City of San Pedro as the said City of San Pedro existed prior to the consolidation of the cities of Los Angeles and San Pedro, for the year commencing July 1, 1912, and ending June 30, 1913, are hereby fixed as follows:

For each telephone installed and maintained in any business office or premises, connected with the central exchange by an independent or individual circuit, with unlimited service, $2.50 per month; for each telephone installed and maintained in any business office or premises connected with the central exchange by a two-party line circuit, with unlimited service, $2.00 per month; for each telephone installed and maintained in any house or place other than a business office or premises connected with the central exchange by an independent or individual circuit, with unlimited service, $2.00 per month; for each telephone installed and maintained in any house or place other than a business office or premises, connected with the central exchange by a two-party line circuit, with unlimited service, $1.50 per month; for each telephone installed and maintained in any house or place other than a business office or premises, connected with a central exchange by a four-party line circuit, with unlimited service, $1.25 per month.

For each extension telephone, either wall or portable, installed and maintained in any business office or premises, $1.00 per month; for each extension wall telephone installed and maintained in any house or place other than a business office or premises, sixty cents per month; for each extension, portable telephone installed and maintained in any house or place other than a business office or premises, eighty-five cents per month.

SEC. 4. That the rates to be charged and collected for telephones, telephone service and telephone connections in the City of Los Angeles furnished by the Pacific Telephone and Telegraph Company to the City of Los Angeles or to the inhabitants thereof, through the exchange maintained and operated by said company in that portion of said city formerly included within the corporate limits of the City of Wilmington as the said City of Wilmington existed prior to the consolidation of the cities

of Los Angeles and Wilmington, for the year commencing July 1, 1912, and ending June 30, 1913, are hereby fixed as follows:

For each telephone installed and maintained in any business office or premises connected with the central exchange by a six-party line circuit, with unlimited service, wall $1.50 per month, portable $1.75 per month; for each telephone installed and maintained in any house or place other than a business office or premises connected with the central exchange by a six-party line circuit, with unlimited service, $1.50 per month. The rates fixed by this section shall apply to both wall and portable telephones, except when otherwise in this section particularly designated.

SEC. 5. That the rate to be charged and collected for telephones, telephone service, and telephone connections in the City of Los Angeles, furnished by the Consolidated Utilities Company of Compton to the City of Los Angeles or to the inhabitants thereof, for the year commencing July 1, 1912, and ending June 30, 1913, are hereby fixed as follows:

For each telephone installed and maintained in any business office, house or other premises connected with the central exchange, by an independent or individual circuit, with unlimited service, $2.50 per month; for each telephone installed and maintained in any business office, house or other premises connected with the central exchange by a party line circuit, with unlimited service, $1.50 per month.

Besides these various schedules, the Los Angeles companies are allowed by ordinance to charge 50 cents more per month for desk telephones, and to add 25 cents to the bill if it is not paid before the 15th of the month.

The Indianapolis rates indicated in the table are rather low. It is claimed, indeed, that they are really too low to be profitable, which seems quite probable. The independent company's franchise permit it, when it has reached 25,000 telephones, to charge a single line rate of $76.00 and $41.00 and a two-party line rate of $56.00 and $35.00.

In St. Paul Bell company bills paid after the 15th of the month are subject to 50 cents more than shown, and Tri-State bills to 25 cents.

In Portland, Ore., 25 cents a month must be added if a desk set is preferred to a wall telephone.

Omaha has the "zone" system to the extent of an "Omaha zone," and a "general zone." The general zone includes Omaha, Benson, Dundee, Florence and South Omaha. The Omaha zone includes Omaha, Benson, Dundee and Florence. In the table the Omaha zone figures are given. General zone business rates are one dollar higher, and residence rates 50 cents higher. For bills paid after the 10th of the month they add 50 cents. There is also a farm line ten party rate of $24.00 net. The Bell company had about 26,000 telephones before it absorbed the independent.

In Nashville business rates are $7.50 per month, or $21.00 for three months if paid in advance. Residence rates are $3.50 per month, or $9.00 for three months in advance.

The Bell Company in Spokane claims 20,000 telephones in use. Trenton, N. J., had 7,580 Bell instruments and 3,007 independent instruments in August, 1911.

Springfield, Mass., has a rate with suburban service and a rate not including the suburbs. The latter is given in the table. Of the former, single line business is $75.00, single line residence is $54.00 and two-party residence is $42.00. The tabulation of $25.00 under four-party residence should properly be listed as six-party.

The Independent Company in Wilmington, Del., charges $3.00 per year additional for residence desk telephones.

In Oklahoma City business rates downtown are $4.20 per month, suburban $5.10. Residence rates within one mile are $2.20, over one mile, $2.75 to $2.90, according to distance.

Holyoke, like other Massachusetts towns, has one set of rates for local service and another set for broader use. A special line for Holyoke, Springfield and Chicopee calls comes at $75.00 business and $42.00 residence.

Central Union Company contracts taken at South Bend, Ind., have the following conditions stamped across their faces:

The following discount from the rate shown in this contract will be allowed by the company on or before the fifteenth of the month in which payment is due:

Thirty-three and one-third per cent discount until 5,000 telephones are directly connected with the South Bend exchange.

Twenty per cent discount after 5,000 telephones and until 6,000 telephones are directly connected with the South Bend exchange.

In Little Rock, Ark., bills not paid before the 15th of the month are subject to 50 cents additional charge.

Rates in Malden, Mass., are for service covering the "Malden district," which includes Everett, Malden, Medford, Melrose and Revere. The total population of this group is 134,972—so the rates are not so high as they seem at first glance.

Independent charges in Butte, Mont., are 25 cents higher than indicated when bills are not paid by the 15th of the month.

The Bell Company in Elmira, N. Y., is credited with 3,340 telephones on the local list, the Independent Company with 2,240.

All Knoxville, Tenn., telephone bills are subject to a 10 per cent penalty if not paid before the 10th of the month.

In Roanoke, Va., the operating company's franchise allows it to collect $6.00 more on each rate when it has more than 2,250 telephones, except single line business, which increases to $60.00. After 4,000 telephones another increase is allowable.

There is no charge for telephoning between the cities of Portsmouth, Va., and Norfolk. The total population served at the Portsmouth rates is therefore 100,642.

Cedar Rapids, Iowa, has at present a four-party residence service at $12.00. Contracts under this listing are not being renewed by the company, however.

Pittsfield, Mass., has a six-party residence service at $18.00. It also has a rate for Pittsfield and four other towns within a ten or twelve mile radius of $57.00 and $45.00 for single line and $45.00 and $36.00 for two-party line.

In Lansing, Mich., the company increases its charges by $3.00 business and $2.00 residence per annum when it has 2,400 telephones, with a further similar increase when 3,200 telephones are connected.

Franchises of both companies in Decatur, Ill., have expired, and the city council and the companies are arranging new ones, with possibly a readjustment of rates.

Rates given for Mount Vernon, N. Y., include Bronxville, Mount Vernon, Pelhams, Tuckahoe and Woodlawn, with a total population of some 38,000.

Four-party residence subscribers in La Crosse, Wis., pay $12.00 for wall sets and $15.00 for desk telephones.

In Pasadena, Cal., residence subscribers on the independent system pay $3.00 a month for single line and $2.50 a month two-party line for service outside a 3½ mile circle. Residence subscribers on the Bell system single line, pay 50 cents a month more for each quarter mile outside a two-mile limit, while two-party subscribers pay 35 cents. There is no extra charge on four-party lines.

Four-party residence subscribers in Colorado Springs pay $2.25 per month for wall sets and $2.50 per month

for desk sets. They also have an eight-party nickel telephone at $1.50 per month.

Service conditions at New Rochelle, N. Y., are similar to those explained above pertaining to Mount Vernon.

Sheboygan, Wis., pays 25 cents more all around if bills are not settled by the 15th of the month.

Moline, Ill., passed an ordinance July 23, 1912, granting the rates indicated to the Bell Company for the next ten years after that, if 18,000 subscribers have been obtained, an increased rate is allowed, with further increases to come later. The Moline local service includes Moline, East Moline, Watertown and Silvis. For service including, besides these, Rock Island and Sears, Ill., and Davenport and Bettendorf, Iowa, the rates are $3.00 higher, except single line business, which is $6.00 higher. The Tri-City Automatic Home Telephone Company was granted a 25-year franchise also, but is not yet operating.

The smaller cities frequently are given service throughout their counties without extra charge. Cumberland, Md., is an example.

Residence schedules of the Bell system in Lockport, N. Y., show an $18.00 rate for unlimited service over a rural "multi-party" line. Glens Falls, N. Y., has a farmers' line business rate of $30.00, residence rate of $18.00.

The independent system at Ann Arbor, Mich., bases its rates on "one party line" and "more than one party line."

The Bell rates in Hornell, N. Y., are subject to a discount of $3.00 from each if paid in advance. The independent rates are discounted 20 per cent for payment monthly or quarterly in advance. Middletown, Ohio, rates come 25 cents higher than shown if not paid before the 15th of the month.

Conditions at Wakefield, Mass., are similar to those at Malden, before described. The Wakefield district includes Melrose, Reading, Stoneham and Wakefield, with a total population of 40,027.

Business desk telephones cost the subscribers in Chickasha, Okla., 25 cents more than wall sets.

The compilation of this table naturally depended upon information from many different sources, and although error has been carefully guarded against, it is always possible, in a work of this kind, that mistakes will creep in. If any operating companies find their rates wrongly quoted, we crave their indulgence, and promise rectification in the first issue following notification.

The population figures are taken from the latest United States census report, 1910.

The next article will take up the subject of measured rates.

City	Population	Company	Business Rates			Residence Rates		
			Single	2-Party	4-Party	Single	2-Party	4-Party
St. Louis, Mo.	687,029	Bell Tel. Co. of Mo.	$78.00	$66.00	.....	$48.00	$36.00	$24.00
St. Louis, Mo.	.....	Kinlock Home Tel. Co. (Ind.)	72.00	60.00	.....	48.00	36.00	24.00
Detroit, Mich.	465,766	Mich. State T. Co. (Bell)	72.00	60.00	.....	42.00	36.00	24.00
Buffalo, N. Y.	423,715	New York T. Co. (Bell)	.....	.....	.....	.....	.....	.....
Buffalo, N. Y.	.....	Federal T. & T. Co. (Ind.)	72.00	60.00	36.00	36.00	.....	24.00
San Francisco, Cal.	416,912	Pac. States T. & T. Co. (Bell)	All meas.	All meas.	All meas.	42.00	36.00	30.00
Cincinnati, Ohio	364,463	Cin. & Sub. T. Co. (Bell)	100.00	.....	All meas.	60.00	42.00	30.00
New Orleans, La.	339,075	Cumberland (Bell)	102.00	.....	.....	54.00	42.00	.....
Washington, D. C.	331,069	Chesapeake & Potomac (Bell)	All Meas.	All meas.	.....	48.00	Measured	Measured
Los Angeles, Cal.	319,198	Pac. States T. Co. (Bell)	63.00	45.00	36.00	27.00	24.00	18.00
Los Angeles, Cal.	.....	Home T. Co. (Ind.)	63.00	45.00	36.00	27.00	24.00	18.00
Minneapolis, Minn.	301,408	Northwestern Co. (Bell)	72.00	48.00	.....	30.00	24.00	.....
Minneapolis, Minn.	.....	Tri-State Co. (Ind.)	48.00	.....	.....	30.00	.....	.....
Kansas City, Mo.	248,381	Mo. & Kan. T. Co. (Bell)	60.00	.....	.....	36.00	30.00	24.00
Seattle, Wash.	237,194	Pac. T. & T. Co. (Bell)	90.00	.....	.....	36.00	30.00	24.00
Providence, R. I.	224,326	Prov. Tel. Co. (Bell)	80.00	60.00	.....	48.00	36.00	.....
Indianapolis, Ind.	233,650	Central Union (Bell)	54.00	40.00	.....	24.00	18.00	.....
Indianapolis, Ind.	.....	Indianapolis Co. (Ind.)	54.00	40.00	.....	24.00	18.00	.....
Louisville, Ky.	223,928	Cumberland (Bell)	66.00	.....	48.00	44.00	.....	36.00
Louisville, Ky.	.....	Louisville Home (Ind.)	48.00	.....	.....	36.00	.....	.....
St. Paul, Minn.	214,744	Northwestern (Bell)	78.00	54.00	.....	48.00	30.00	.....
St. Paul, Minn.	.....	Tri-State (Ind.)	48.00	.....	.....	30.00	.....	.....
Portland, Ore.	207,214	Pac. T. & T. Co. (Bell)	96.00	60.00	.....	36.00	27.00	24.00
Syracuse, N. Y.	137,249	N. Y. Tel. Co. (Bell)	60.00	48.00	.....	36.00	30.00	.....
New Haven, Conn.	133,605	So. New England (Bell)	84.00	60.00	.....	36.00	30.00	.....
Scranton, Pa.	129,867	Bell T. Co. of Pa.	.....	.....	.....	36.00	30.00	24.00
Scranton, Pa.	.....	Consol. T. Cos. of Pa. (Ind.)	42.00	36.00	.....	30.00	26.00	.....
Richmond, Va.	127,628	Southern Bell Co.	72.00	.....	.....	36.00	24.00	.....
Omaha, Neb.	124,096	Nebraska T. Co. (Bell)	84.00	66.00	.....	36.00	30.00	.....
Nashville, Tenn.	110,364	Cumberland (Bell)	90.00	.....	.....	42.00	.....	.....
Spokane, Wash.	104,402	Pacific T. & T. Co. (Bell)	72.00	.....	.....	36.00	30.00	.....
Spokane, Wash.	.....	Home Tel. Co. (Ind.)	48.00	.....	.....	24.00	.....	.....
Bridgeport, Conn.	102,054	New England T. & T. (Bell)	84.00	.....	.....	36.00	.....	.....
Hartford, Conn.	98,915	New England T. & T. (Bell)	84.00	60.00	.....	36.00	30.00	.....
Trenton, N. J.	96,815	Delaware & Atlantic (Bell)	60.00	48.00	39.00	30.00	24.00	.....
Trenton, N. J.	.....	Interstate Co. (Ind.)	36.00	30.00	.....	24.00	18.00	.....
New Bedford, Mass.	96,652	So. Mass. T. Co. (Bell)	66.00	.....	36.00	25.00	.....	.....
New Bedford, Mass.	.....	Automatic (Ind.)	25.00	.....	.....	18.00	.....	.....
Salt Lake City, Utah	92,777	Mountain States (Bell)	78.00	.....	.....	36.00	30.00	24.00
Springfield, Mass.	88,926	New England (Bell)	75.50	.....	.....	54.00	42.00	.....
Wilmington, Del.	87,411	Delaware & Atlantic (Bell)	60.00	48.00	39.00	36.00	30.00	24.00
Wilmington, Del.	.....	Wilmington Automatic (Ind.)	46.00	.....	.....	21.00	.....	.....
Des Moines, Iowa	86,368	Iowa T. Co. (Bell)	60.00	48.00	.....	30.00	24.00	.....
Lawrence, Mass.	85,892	New England (Bell)	57.00	54.00	.....	33.00	27.00	25.00
Tacoma, Wash.	83,743	Pacific T. & T. (Bell)	72.00	48.00	.....	36.00	24.00	.....
Yonkers, N. Y.	79,803	New York T. Co. (Bell)	90.00	.....	.....	36.00	30.00	.....
Schenectady, N. Y.	72,826	New York T. Co. (Bell)	60.00	48.00	.....	36.00	30.00	24.00
Erie, Pa.	66,525	Bell T. Co. of Pa.	60.00	48.00	30.00	30.00	24.00	20.00

City	Population	Company	Business Rates			Residence Rates		
			Single	2-Party	4-Party	Single	2-Party	4-Party
Erie, Pa.	.....	Mutual T. Co. (Ind.)	40.00	30.00	.....	28.00	22.00	.....
Akron, Ohio	69,067	Central Union (Bell)	54.00	36.00	.....	30.00	24.00	.....
Akron, Ohio	.....	Akron Peoples (Ind.)	42.00	30.00	.....	30.00	20.00	18.00
Savannah, Ga.	65,064	So. Bell Co.	60.00	.....	.....	36.00	.....	.....
Oklahoma City, Okla.	64,205	Pioneer (Bell)	61.20	.....	.....	34.80	.....	21.00
Holyoke, Mass.	57,730	New England (Bell)	51.00	42.00	.....	30.00	24.00	21.00
South Bend, Ind.	53,684	Central Union (Bell)	45.00	30.00	.....	24.00	18.00	.....
South Bend, Ind.	.....	Home Tel. Co. (Ind.)	36.00	.....	.....	24.00	.....	18.00
Jacksonville, Fla.	57,699	So. Bell T. Co.	60.00	.....	.....	30.00	24.00	.....
Allentown, Pa.	51,913	Bell T. Co. of Pa.	48.00	42.00	36.00	36.00	30.00	24.00
Allentown, Pa.	.....	Consol. T. Co. (Ind.)	22.00	.....	.....	16.00	.....	.....
Springfield, Ill.	51,678	Central Union (Bell)	48.00	36.00	.....	30.00	24.00	.....
Springfield, Ill.	.....	Inter-State (Ind.)	36.00	.....	.....	21.60	.....	.....
Mobile, Ala.	51,521	So. Bell T. Co.	48.00	.....	.....	.....	.....	.....
Mobile, Ala.	.....	Home T. Co. (Ind.)	30.00	.....	.....	.....	.....	.....
Sioux City, Iowa	47,828	Iowa Tel. Co. (Bell)	48.00	.....	.....	24.00	.....	18.00
Sioux City, Iowa	.....	Sioux City T. Co. (Ind.)	36.00	.....	.....	24.00	.....	.....
Little Rock, Ark.	45,941	Southwestern (Bell)	48.00	.....	.....	27.00	.....	.....
Chattanooga, Tenn.	44,604	E. Tenn. T. Co. (Bell)	48.00	.....	.....	24.00	.....	.....
Malden, Mass.	44,404	New England T. Co. (Bell)	60.00	54.00	.....	36.00	27.00	.....
Lincoln, Neb.	43,973	Neb. T. Co. (Bell)	48.00	36.00	.....	24.00	18.00	.....
Lincoln, Neb.	.....	Lincoln T. Co. (Ind.)	48.00	36.00	.....	24.00	18.00	.....
New Britain, Conn.	43,916	So. New England (Bell)	60.00	48.00	.....	36.00	24.00	.....
Augusta, Ga.	41,040	So. Bell T. Co.	60.00	.....	.....	36.00	24.00	.....
San Diego, Cal.	39,578	Pac. T. & T. (Bell)	60.00	42.00	.....	24.00	21.00	18.00
San Diego, Cal.	.....	San Diego Home (Ind.)	48.00	.....	.....	24.00	.....	.....
Kalamazoo, Mich.	39,437	Mich. State (Bell)	42.00	36.00	.....	24.00	18.00	.....
Butte, Mont.	39,165	Mountain States (Bell)	60.00	48.00	.....	30.00	24.00	18.00
Butte, Mont.	.....	Ind. Tel. Co.	72.00	54.00	48.00	36.00	.....	24.00
Flint, Mich.	38,550	Mich. State (Bell)	36.00	30.00	.....	24.00	18.00	.....
Flint, Mich.	.....	Valley T. Co. (Ind.)	24.00	.....	.....	12.00	.....	.....
Racine, Wis.	38,002	Wis. Tel. Co. (Bell)	42.00	30.00	.....	24.00	18.00	.....
Tampa, Fla.	37,782	Peninsular T. Co. (Ind.)	54.00	.....	.....	30.00	24.00	.....
Elmira, N. Y.	37,176	New York T. Co. (Bell)	54.00	42.00	.....	30.00	24.00	18.00
Elmira, N. Y.	.....	York State (Ind.)	48.00	36.00	24.00	30.00	24.00	18.00
Quincy, Ill.	36,587	Central Union (Bell)	48.00	36.00	.....	24.00	18.00	.....
Quincy, Ill.	.....	Quincy Home (Ind.)	48.00	36.00	.....	24.00	18.00	.....
Knoxville, Tenn.	36,346	Cumberland (Bell)	48.00	.....	.....	24.00	.....	.....
Knoxville	.....	Peoples T. & T. (Ind.)	48.00	.....	.....	24.00	.....	.....
Dallas, Texas	35,748	Southwestern (Bell)	60.00	.....	.....	24.00	.....	.....
Dallas, Texas	.....	Dallas-Antonio (Ind.)	60.00	.....	.....	24.00	.....	.....
Springfield, Mo.	35,201	Mo. & Kan. T. Co. (Bell)	36.00	.....	.....	22.00	.....	.....
Lexington, Ky.	35,099	Cumberland (Bell)	48.00	30.00	.....	24.00	18.00	.....
Lexington, Ky.	.....	Fayette Home (Ind.)	48.00	30.00	.....	24.00	18.00	.....
Roanoke, Va.	34,874	Va. & Tenn. Co. (Ind.)	48.00	42.00	36.00	30.00	24.00	15.00
East Orange, N. J.	34,371	New York Tel. Co. (Bell)	60.00	42.00	36.00	48.00	39.00	30.00
Charlotte, N. C.	34,014	So. Bell T. Co.	40.00	.....	.....	24.00	.....	.....
Portsmouth, Va.	33,190	So. Bell T. Co. (Bell)	72.00	60.00	.....	36.00	30.00	24.00
Cedar Rapids, Iowa	32,811	Cedar Rapids & Marion (Bell)	36.00	.....	.....	24.00	18.00	.....
Pittsfield, Mass.	32,121	New Eng. T. Co. (Bell)	45.00	36.00	.....	30.00	24.00	21.00
Joplin, Mo.	32,073	Mo. & Kans. Co. (Bell)	30.00	24.00	.....	24.00	18.00	.....
Joplin, Mo.	.....	Home T. Co. (Ind.)	30.00	24.00	.....	24.00	18.00	.....
Lansing, Mich.	31,229	Citizens (Ind.)	30.00	24.00	.....	20.00	16.00	.....
Decatur, Ill.	31,140	Central Union (Bell)	36.00	30.00	.....	24.00	18.00	.....
Decatur, Ill.	.....	Decatur Home (Ind.)	36.00	30.00	.....	24.00	18.00	.....
Mount Vernon, N. Y.	30,919	New York T. Co. (Bell)	60.00	.....	.....	36.00	24.00	.....
Lima, Ohio	30,508	Central Union (Bell)	42.00	.....	24.00	24.00	.....	15.00
Lima, Ohio	.....	New Lima Co. (Ind.)	36.00	30.00	.....	24.00	18.00	.....
Niagara Falls, N. Y.	30,445	New York T. Co. (Bell)	72.00	.....	36.00	36.00	.....	18.00
Niagara Falls, N. Y.	.....	Niagara County (Ind.)	36.00	.....	.....	15.00	.....	.....
La Crosse, Wis.	30,417	Wis. Tel. Co. (Bell)	36.00	30.00	24.00	24.00	18.00	12.00
La Crosse, Wis.	.....	La Crosse T. Co. (Ind.)	36.00	30.00	24.00	24.00	18.00	12.00
Pasadena, Cal.	30,291	Pac. T. T. Co. (Bell)	48.00	36.00	.....	30.00	24.00	18.00
Pasadena, Cal.	.....	Home T. Co. (Ind.)	48.00	.....	.....	27.00	24.00	.....
Aurora, Ill.	29,807	Chicago T. Co. (Bell)	48.00	36.00	.....	36.00	24.00	18.00
Aurora, Ill.	.....	Inter-State (Ind.)	30.00	24.00	21.00	18.00	.....	15.00
San Jose, Cal.	28,946	Pac. T. & T. Co. (Bell)	60.00	42.00	.....	36.00	27.00	18.00
Colorado Springs, Colo.	29,078	Mountain States (Bell)	72.00	60.00	.....	48.00	36.00	27.00
New Rochelle, N. Y.	28,867	New York T. Co. (Bell)	60.00	.....	.....	36.00	30.00	24.00
Easton, Pa.	28,523	Bell T. Co. of Pa.						
Easton, Pa.		N. J. & Penn. (Ind.)	30.00	.....	.....	24.00	.....	.....
Zanesville, Ohio	28,026	Central Union (Bell)	42.00	30.00	.....	24.00	18.00	.....
Zanesville, Ohio	.....	Zanesville T. Co. (Ind.)	33.00	24.00	.....	18.00	.....	12.00
Danville, Ill.	27,871	Central Union (Bell)	30.00	.....	.....	18.00	.....	.....
Newburgh, N. Y.	27,805	New York T. Co. (Bell)	48.00	42.00	.....	30.00	24.00	.....
Waterloo, Iowa	26,693	Corn Belt T. Co. (Bell)	36.00	.....	.....	24.00	18.00	.....
Sheboygan, Wis.	26,398	Wis. T. Co. (Bell)	42.00	30.00	.....	.....	18.00	.....
Elgin, Ill.	25,976	Chicago T. Co. (Bell)	48.00	36.00	.....	36.00	24.00	18.00
Elgin, Ill.	.....	Inter-State (Ind.)	24.00	.....	.....	12.00	.....	.....
Bloomington, Ill.	25,768	Central Union (Bell)	42.00	30.00	24.00	24.00	18.00	12.00
Bloomington, Ill.	.....	Kinlock (Ind.)	30.00	24.00	.....	20.00	16.80	15.00
Clinton, Iowa	25,577	Iowa T. Co. (Bell)	48.00	36.00	27.00	24.00	18.00	12.00

City	Population	Company	Business Rates			Residence Rates		
			Single	2-Party	4-Party	Single	2-Party	4-Party
Clinton, Iowa	.....	Tri-City (Ind.)	36.00	27.00	.....	24.00	18.00	12.00
Newark, Ohio	25,404	Central Union (Bell)	36.00	.....	.....	18.00	15.00	.....
Newark, Ohio	.....	Newark T. Co. (Ind.)	30.00	24.00	.....	21.00	18.00	15.00
Green Bay, Wis.	25,236	Wis. T. Co. (Bell)	42.00	30.00	.....	24.00	18.00	.....
Madison, Wis.	25,531	Wis. T. Co. (Bell)	42.00	.....	.....	24.00	18.00	12.00
Rock Island, Ill.	24,335	Central Union (Bell)	60.00	.....	.....	36.00	.....	.....
Moline, Ill.	24,199	Central Union (Bell)	54.00	39.00	.....	27.00	21.00	18.00
Moline, Ill.	.....	Tri-City (Ind.)	54.00	.....	.....	24.00	.....	.....
Petersburg, Va.	24,127	Petersburg T. Co. (Ind.)	48.00	.....	.....	30.00	.....	.....
Oswego, N. Y.	23,368	New York T. Co. (Bell)	36.00	24.00	.....	18.00	15.00	.....
Cumberland, Md.	21,839	Chesapeake & Potomac (Bell)	36.00	24.00	.....	24.00	18.00	.....
Gloversville, N. Y.	20,642	Glen Tel. Co. (Ind.)	42.00	.....	.....	30.00	.....	18.00
Norwich, Conn.	20,367	So. New Eng. T. Co. (Bell)	60.00	42.00	.....	36.00	24.00	.....
Newport News, Va.	20,205	(Bell)	48.00	.....	.....	30.00	.....	.....
Oak Park, Ill.	19,444	Chicago T. Co. (Bell)	48.00	36.00	.....	36.00	24.00	18.00
East Chicago, Ind.	19,098	Chicago T. Co. (Bell)	60.00	36.00	.....	36.00	24.00	18.00
Tulsa, Okla.	18,182	Pioneer T. & T. Co. (Bell)	36.00	30.00	.....	24.00	18.00	.....
Lockport, N. Y.	17,970	New York T. Co. (Bell)	48.00	42.00	36.00	30.00	24.00	18.00
Lockport, N. Y.	.....	Niagara County (Ind.)	36.00	24.00	.....	24.00	15.00	12.00
Austin, Texas	17,699	Southwestern Bell	48.00	.....	.....	24.00	.....	.....
Austin, Texas	.....	Ind. Tel. Co.	36.00	.....	.....	24.00	.....	.....
Ogdensburg, N. Y.	15,933	New York T. Co. (Bell)	42.00	36.00	30.00	30.00	24.00	18.00
Fort Dodge, Iowa	15,543	Local T. Co. (Ind.)	30.00	.....	.....	.....	12.00	.....
Middletown, N. Y.	15,313	Orange County T. Co. (Ind.)	48.00	42.00	.....	30.00	24.00	21.00
Glens Falls, N. Y.	15,243	New York T. Co. (Bell)	48.00	42.00	30.00	30.00	24.00	18.00
Laredo, Texas	14,855	Southwestern (Bell)	36.00	.....	.....	24.00	.....	.....
Ann Arbor, Mich.	14,817	Mich. State (Bell)	24.00	18.00	.....	18.00	15.00	.....
Ann Arbor, Mich.	.....	Home T. Co. (Ind.)	24.00	18.00	.....	18.00	12.00	.....
Ithaca, N. Y.	14,802	New York T. Co. (Bell)	48.00	42.00	.....	30.00	24.00	18.00
Ithaca, N. Y.	.....	Ithaca T. Co. (Ind.)	36.00	30.00	24.00	24.00	20.00	15.00
Great Falls, Mont.	13,948	Mountain States (Bell)	54.00	42.00	.....	30.00	.....	18.00
Great Falls, Mont.	.....	Great Falls Autom. (Ind.)	54.00	42.00	.....	30.00	.....	18.00
Janesville, Wis.	13,894	Wis. Tel. Co. (Bell)	30.00	.....	.....	18.00	.....	12.00
Janesville, Wis.	.....	Rock County T. Co. (Ind.)	24.00	.....	.....	18.00	.....	12.00
Enid, Okla.	.....	Pioneer T. & T. Co. (Bell)	36.00	.....	.....	24.00	.....	.....
Hornell, N. Y.	13,617	New York T. Co. (Bell)	42.00	36.00	30.00	27.00	24.00	18.00
Hornell, N. Y.	.....	Federal T. Co. (Ind.)	36.00	30.00	.....	25.00	.....	18.00
Middletown, Ohio	13,152	Middletown T. Co. (Bell)	36.00	.....	.....	18.00	.....	.....
Sault Ste. Marie, Mich.	12,615	Mich. State T. C. (Bell)	36.00	.....	.....	24.00	18.00	.....
Shawnee, Okla.	12,474	Pioneer T. Co. (Bell)	36.00	.....	.....	21.00	.....	15.00
Shawnee, Okla.	.....	Shawnee T. Co. (Ind.)	36.00	.....	.....	21.00	.....	15.00
Little Falls, N. Y.	12,273	New York T. Co. (Bell)	42.00	.....	30.00	21.00	.....	15.00
Wakefield, Mass.	11,404	New England T. Co. (Bell)	54.00	48.00	.....	33.00	24.00	.....
Argenta, Ark.	11,138	Southwestern T. Co. (Bell)	48.00	.....	.....	27.00	.....	.....
Plattsburgh, N. Y.	11,138	New York T. Co. (Bell)	30.00	.....	.....	18.00	.....	.....
Plattsburgh, N. Y.	.....	Clinton T. Co. (Ind.)	30.00	.....	.....	18.00	.....	.....
Gadsden, Ala.	10,557	Southern Bell T. Co.	42.00	.....	.....	24.00	.....	.....
Chickasha, Okla.	10,320	Pioneer T. Co. (Bell)	30.00	.....	.....	18.00	.....	.....

Nebraska Commission News

At the close of a recent hearing before the Nebraska Railway Commission, City Attorney Fred C. Foster made a brief argument in favor of his application for speedy connection of the Bell and automatic telephone exchanges in Lincoln or the giving of the service of both telephones for one price. He was followed by Frank Woods for the Lincoln Telephone and Telegraph Company, and the case was taken under advisement by the Railway Commissioners Winnett, Clarke and Hall.

Action was ordered by the state railway commission against the Lincoln Telephone and Telegraph Company, which controls the telephone business in the southern half of Nebraska. The commission has directed Attorney General Martin to file suit against the company on the ground that it has changed rates without permission of the commission. The Lincoln company recently absorbed an independent line in Gage county, and it is alleged changed the rates in force without consent. A common carrier found guilty of such offense may be fined not to exced $10,000 under the Nebraska laws.

The Platte Valley Telephone Company, of Scotts Bluff, through Manager Alexander, has asked the commission to permit it to devise some way whereby it can prevent its patrons from relaying messages. A lumber company which has a line of yards in towns reached by the telephone company is evading the rules. It is the rule of the telephone company that free service shall be granted to the town adjacent to the town where the subscriber lives, but beyond that territory free service is not given. The lumbermen telephone as far as they possibly can under the free service rule and have one of their agents accept the message and he in turn telephones to the town adjacent to his residence, and in this way the lumbermen are able to communicate with their yards for a long distance, contrary to the rule of the telephone company regarding free service. The telephone company does not object to one firm or one man doing the talking at the various towns, but it objects to every one evading the rule. The price charged for business phones is $2.50 a month. No formal request has been filed by the telephone company and the commission has taken no action.

The commission has granted leave to the Liberty Telephone Company to issue stock amounting to the small sum of $50. This was done by Commissioners Winnett and Clarke without waiting for Commissioner Hall to demand a physical valuation of the company's property.

The Telephone Scrap Book

The Telephone and the "Fan"

THE national game and the national means of quick communication—the telephone—are beginning to be inseparable. The value of the telephone to the baseball "fan" who cannot take the afternoon off or has no more grandmothers to follow to the grave, is evidenced by the increasing number of telephones found in the press box, whereby accounts of games, inning by inning, are telephoned to the newspaper offices and displayed at once on the bulletin boards. Back of the stands, the fan may find pay station telephone booths, which he may utilize for communication with his office while at the game, or with his wife if he finds that extra innings have to be played and supper delayed.

The latest aid to the game-going fan is a recent addition to the already numerous telephonic wonders of the twentieth century—the loud-speaking telephone. This instrument, which combines the sound intensifying properties of the megaphone with the articulating properties of the telephone receiver, is capable of producing spoken words which may easily be heard at a considerable distance. Ordinarily, the commercial telephone receiver cannot make itself heard if held away from the ear.

In the new Western Electric "loud-speaking" telephone these difficulties have been overcome, and twelve have been installed at the Washington Park grounds of the Brooklyn (National League) Baseball Club. It will no longer be a case if, "if you haven't got a score-card, you can't follow the game." It will be: "If the ball grounds haven't got loud-speaking telephones, you'll miss half the game."

The telephones have been placed in various parts of the grandstand, fastened to the posts. One day recently every one of the fans in the grandstand was surprised to hear a clear and loud announcement of the batteries for the day's game come out of the horns of the instruments. The faces of the fans made a picture of undisguised astonishment and delight.

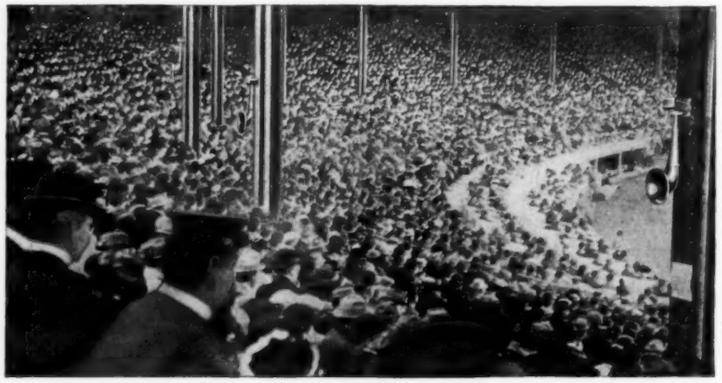
All the telephones announce, simultaneously, every man as he comes to bat and other interesting incidents of the game. They also serve to call spectators to the public telephone to receive messages. The transmitting end of the system is in the press box, from which all announcements originate.

The loud-speaking telephones have proven a distinct success and in all possibility will be installed in Ebbets Field, which, when completed, will be the new home of the Brooklyn Club. The time is not far distant when every baseball field will be equipped with these "first-aids-to-the-fan."

Telephone Receiver of New Design

IN the early stages of the art of transmitting sound waves over wires by means of electrical waves a receiver was used. Reis first adapted the telegraph for transmitting sound waves. He used an ordinary telegraph contact actuated by a rubber drum as a transmitting device; and as a receiver the ordinary old telegraph magnet with or without an armature. The receiving depends upon the so-called Page effect, named after the man who first recognized the molecular vibrations of a magnet.

When Dr. Alexander Graham Bell invented his magneto-transmitter, the operation of which is due to the inductive action of a vibrating diaphragm-armature on a magnet, the receiver magnet had to be encased in the same way as the transmitter, since it served the twofold purpose of transmitter and receiver. However, it really was a transmitter and not a receiver; for, as a receiver it operated by the Page effect, as was proven by an investigator who used a diaphragm one foot thick without destroying its operativeness as a receiver, but it certainly did destroy its effectiveness as a transmitter. Since then nothing has been done even as regards shape, and few if any improvements have been made excepting in the use of better quality of materials and better construction.



Loud Speaking Telephone in Baseball Grandstand.

A few years ago Mr. Charles J. Glidden, a well-known telephone official, offered a one-million-dollar prize for a device which would establish telephonic communication between San Francisco and New York. A paper containing this announcement happened to fall into Andrew Plecher's hands and he began investigations. "After some trials," he says in *Telegraph and Telephone Age*, "I designed an alternating current transmitter in which the diaphragm operated a lever with a double contact. This instrument was not a commercial success, but it proved to my satisfaction that not the transmitter but the receiver prevented long distance communication by choking off high-frequency alternations.

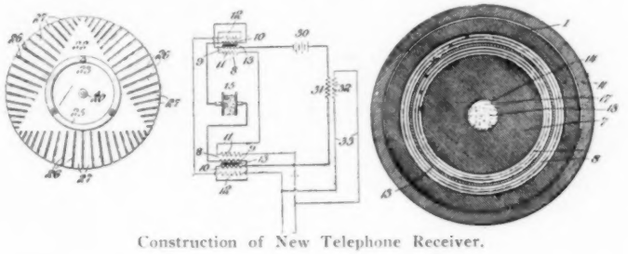
"Completely convinced, I set to work to find a receiver which would not choke off waves without having produced the desired effect. This could evidently not be a receiver with an ordinary telegraph magnet. My attention was directed to the wireless art, but I was disappointed, for the coherer needed a telephone receiver to be of any service. Patent No. 744,936 for wireless telegraphy was the result of this diversion, although by hook or crook the part especially referring to the wireless receiver was omitted in the application and the part referring to the telephone and annunciator was described as a wireless receiver. I was well aware that a telephone receiver

comprising a liquid could never become popular, so I reverted to the magnetic principle.

"A new magnet had to be designed, and the idea occurred to me of using the induction coil directly in the telephone receiver. The fact that every induction coil had to be constructed by the cut-and-dry method led me to invent a new induction coil.

"This new receiver is made up of three separate, patentable parts, namely, a new induction coil, a new diaphragm, a microphone taking the place of the circuit-breaker of an induction coil.

"The induction coil is built up to obtain a balancing or tuning effect in the different circuits by first winding the secondary on a non-inductive spool, and upon this the primary, then slipping over these windings an annular magnetic core, winding another primary, then a secondary, on the outside of the annular magnetic core, and encasing the whole with non-inductive material. The primary circuit includes the battery and the microphonic element. The battery current produces permanent magnetism in the annular magnetic core, whereby the energy of the magnet can be controlled to the finest degree, a feature not possible in the old receiver. The interaction of primary and secondary on each other becomes a definite quantity, and the whims and stubbornness of a horseshoe magnet are avoided, thus the new receiver has a hundred possibilities not to be found in the old receiver.



Construction of New Telephone Receiver.

"An auxiliary induction coil is shown, not because such is necessary for the receiver, since its embodiment in the new receiver in place of the horseshoe magnet forms one of the principal ideas of the invention, but to show how a second receiver-coil may be connected into the different circuits. It is evident that the induction coil in the new receiver dispenses with the one necessary in the transmitting circuit of the old arrangement. Multiplex telephony has a chance unknown before.

"The circular magnetic diaphragm has very fine incisions from the periphery inward, so as to form reeds or teeth similar to those in a music box, but leaving an inner circular space free of incisions. It is supported near the new magnet in such a manner that the supports form fulcra between the inner circular space and the outer comblike parts. The annular magnetic core acts on the tips of the reeds or teeth of the diaphragm. By reason of the spring-leverage of the new diaphragm due to its manner of being supported, the size of the new diaphragm is not limited to a few inches in diameter as in the old receiver, but may be made larger to meet requirements. Everyone is supposed to know that if the old receiver diaphragm is made any larger in diameter the middle part will dent inward toward the magnet and short-circuit the poles and stick permanently to them.

"To the inner circular space of the new diaphragm is attached a microphonic element operated by the diaphragm. The microphonic element finds ample space in the bore of the spool of non-inductive material upon which the induction coil is wound. A granular carbon microphone is shown, not because it is the best for the purpose, but because it was easy to show on a drawing.

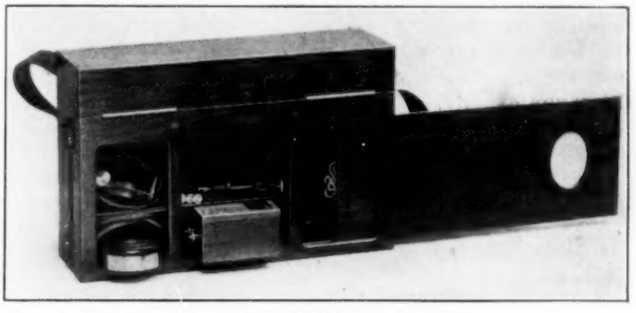
"The use of a microphone in a receiver is an entirely new feature, and would lead the casual observer to think that the instrument was designed to serve two purposes, but this is not the case. The microphone in the new receiver makes receiving possible by augmenting and accentuating the fluctuations of the current in the primary circuit. The reader should observe now that the new magnet gives the highest electro-magnetic elasticity and the microphone in conjunction with the spring-leverage of the diaphragm give the highly desirable, unstable equilibrium of the mechanical parts of the new receiver. It is thus ever ready to respond fully and forcibly to the lowest as well as the highest frequency of incoming alternations and translate them into audible sound waves."

A German Telephone Bridge for Testing Arresters

THE accompanying illustration shows one form of German instrument utilizing the telephone bridge for making tests of lightning arresters. This instrument is used for measuring the electrical resistance of liquids or underground conductors placed in wet soil such as lightning arrester connections.

As the resistance of liquid is not measured by a direct current and a galvanometer, an alternating current being used in connection with a telephone, the equipment shown in the photograph has been devised at Frankfort-on-the-Main, Germany.

The principle of the measurement is made as in the balance scale comparing the resistance to be measured with a standard resistance in the instrument. For instance, on the beam, the standard weight is shifted until the pointer on the graduated arm is at zero and balances. In the same manner, the standard resistance is shifted on a measuring wire until the index shows zero and is so indicated by listening in the telephone receiver. When the zero point is reached the least sound is heard or no sound at all.



For Testing Lightning Arresters.

There is a current breaker provided in the apparatus to produce an alternating current for the telephone and the reading is taken on a visible graduated shift scale.

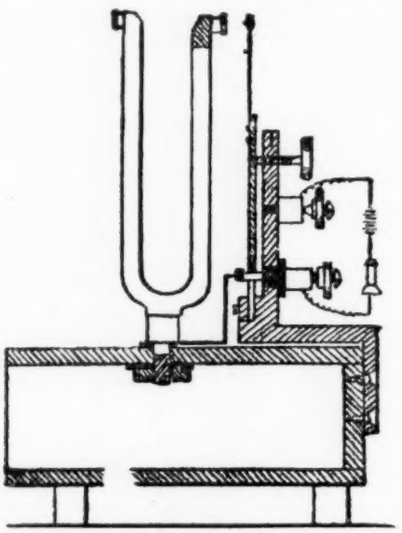
The apparatus consists of two separate parts including a box with the battery, induction coil and interrupter which produces the pulsatory or alternating current and

the telephone bridge proper, which includes the telephone receiver flexible cord and connections. Very accurate results are obtained with this convenient and simple device.

Various forms of this apparatus have been devised, varying in weight from 1.3 kilograms for the small pocket size to 5.5 kilograms for the more elaborate instruments and measuring from 0 to 200 ohms. The telephone bridge of Nippoldt only weighs .5 kilograms and measures resistances from .1 ohm to 1,000 ohms.

Telephone for Grading Voices

FOR accurately registering the human voice—determining the range and the tone—a German woman has invented a most ingenious apparatus. A large tuning fork is mounted on a sounding box and provided with an electrical contact on one of its forked members. There is an electric circuit, including a source of current and a receiver with one line connected with said fork, and co-



Getting an Accurate Register.

acting with it to make and break circuits upon the vibration of the fork. Because of lack of distinctness it is not always possible accurately to "place" a voice under ordinary conditions. This apparatus brings the tones to the teacher's ear with so much distinctness and exaggeration of quality that it is no trouble at all to determine the range exactly.

Joint Pole-Line Construction

AN important consideration bearing on the subject of joint pole-line agreements, as pointed out by Mr. J. L. Spore, Toledo, Ohio, in presenting his report on joint telephone and electric-light construction before the convention of the Ohio Electric Light Association at Cedar Point, Ohio, reported in the *Electrical World*, is the effect such agreements may have on the financial standing of the companies involved.

To the company having a joint-line agreement, with therefore very little independent construction of its own, and desiring to float an issue of bonds the financier might be less willing to advance money on the ground that a joint pole line is not a tangible asset of either company. But if the joint pole-line agreement were so worded that neither party thereto forfeited any of its original franchise rights for the construction of independent lines in the streets, the principal objection to the joint pole line from a financial standpoint would be eliminated.

There is also a deep-rooted prejudice against joint-pole construction among linemen of both tele-

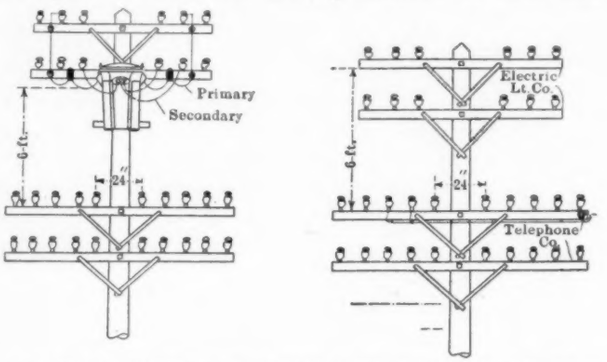


Fig. 1 and 2. Disposition of Electric Light and Telephone Wires on Joint-Pole Line.

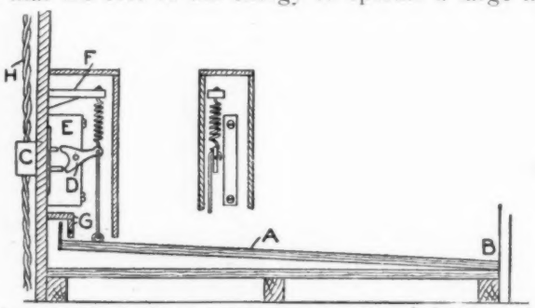
phone and electric light companies, on the ground of greater danger to themselves in the performance of their duties, but this is due mainly to haphazard methods of construction.

The installation of joint-pole construction with substantially the clearances shown in the illustrations would do much toward overcoming the linemen's prejudice against this type of construction.

In closing, the author declared himself in favor of having every wire on any street occupy its proper place on a good, safe, well-constructed joint-pole line. If there are so many wires that it becomes necessary to use steel towers in place of poles, and the cost of underground construction is prohibitive, then let steel towers be used.

Operating Booth Fan and Lights Automatic

MANY telephone companies, in their desire to make the public as comfortable as possible while using their phones by installing electric fans in the booths, find that the cost of the energy to operate a large num-



The Switch Is Operated by the Movable Floor When the Person Talking Steps Upon It.

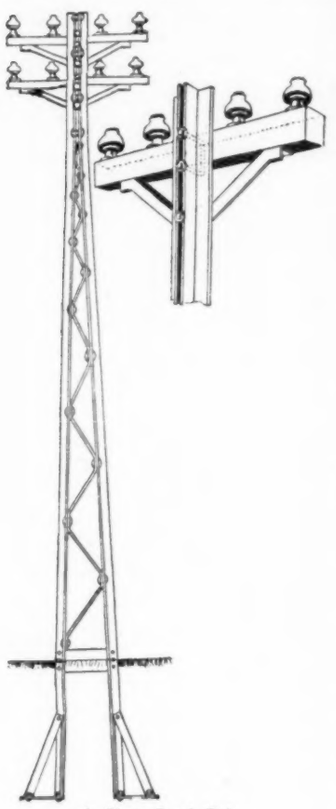
ber of these fans continuously for a month is quite an item, says *Popular Mechanics.*

A number of different methods may be used, however, to automatically disconnect the fan when the booth is not occupied. The accompanying illustration shows one method of opening and closing the circuit automatically by means of a false floor, *A*, placed in the booth, it being hinged at the front end *B* and normally raised at the back end by a coiled spring.

Steel Telephone Poles

STEEL poles for telephone wires have not seen much use so far, but there is no reason why, if requirements are properly met, they should not prove a formidable rival to wood or even concrete poles.

The form of steel telephone pole shown by the drawing is made in Chicago Heights, Ill., under the trade name of "Carbo." A number of advantages over wood poles are claimed for steel poles of this type. They are, of course, proof against lightning, fire dry rot and insects. They are not easily broken — in fact, it is practically impossible in practice to subject them to injurious stresses, especially when they are calculated in accordance with engineering data.



A New Steel Pole.

The type illustrated is used without concrete, even at the base, being so constructed that it takes a solid footing without assistance.

The weights given for Carbo steel poles average about two-thirds the weights of wood poles for similar uses. They require, of course, no shaving or cutting of gains and no cross bracing or cross anchoring.

As to the life of steel poles, it is claimed that their maintenance is about one per cent per annum. This would give a life of one hundred years; but a safe figure is fifty years. They should, of course, be painted carefully each year above and at the ground line; pure asphalt applied hot from a ladle being used at the latter point.

The poles' tops are so arranged that cross arms may be placed at any point desired without any additional or special hardware.

Steel poles have an advantage in packing, in that more may be nested into a car or wagon than in the case of wood poles.

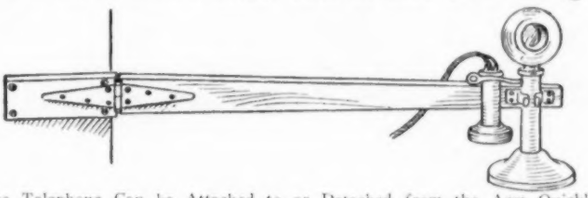
The almost universal use of structural steel poles or towers for high tension transmission is doubtless the reason for the growing interest of telephone men in the system.

Effects of Carbon on Various Steels

According to statistics published in *Comptes Rendus*, the electrical resistance of carbon steel increases with the per cent of carbon. The resistance of nickel steel also increases with the addition of carbon and also with the increase in percentage of nickel up to 35 per cent. In manganese steel the percentage of carbon does not seem to affect the resistance to any great extent. The greatest resistance is found when 12 to 13 per cent of manganese is used. Chromium steel, too, seems to be unaffected by the carbon content, but the resistance is increased and reduced periodically with the increase in percentage of chromium. Tungsten steel also shows a variation that is quite irregular.

Arm for Holding a Telephone

A VERY substantial and easily constructed telephone arm can be made of a piece of wood, a strap hinge and a metal lantern holder such as used on a carriage, according to O. B. Wright in *Popular Mechanics*. The wood may be in any length to suit the requirements. It is hinged to a wall as shown in the illustration. The lantern holder is fastened to the outer end to receive the standard of the telephone. The outer end of the arm, at which the lantern holder is attached, also may be hinged to make a combination extension.



The Telephone Can be Attached to or Detached from the Arm Quickly When It Is Used on the Desk.

Michigan Commission News

United telephone subscribers at Pentwater are endeavoring to secure adverse decision by the Michigan Railroad Commission in the matter whereby the company deprived the subscribers of free service outside the local exchange.

The Riga Farmers' Telephone Company has renewed its application before the commission for a certificate of necessity and public convenience. The company proposes to open an exchange at Blissfield if the commission sees fit to allow the order. There are already three companies doing business at Blissfield, which has a population of less than 1,500. There are the Michigan State Telephone Company, the Blissfield Telephone Company and the Deerfield Farmers' Telephone Company. The two latter companies declare they will fight the new project.

The Three Rivers and Birch Lake Telephone Companies have asked the state railroad commission for permission to merge with the Southern Michigan Telephone Company which has headquarters at Burr Oak. The telephone companies seeking to merge are doing business at present in St. Joseph and Cass counties.

Plan Telephone Pioneer Reunion

At a recent meeting of the general committee on arrangements for the second annual reunion of the Telephone Pioneers of America, it was determined that the second annual meeting will be held at the Hotel Astor, New York City, on November 14 and 15. According to the tentative program, the first day will be given up to a general business meeting in the morning, followed by addresses in the afternoon. In the evening a reception will be given under the auspices of the New York Telephone Society. The second day will be given over to entertainment features and a banquet in the evening. Henry W. Pope, 26 Cortlandt street, New York, is secretary and treasurer of the organization.

Condition of Poles After 5 to 8 Years

By Carlile P. Winslow*

FOREST Service Bulletin 84, "Preservative Treatment of Poles," describes experiments made by the U. S. Forest Service concerning the effect of the seasoning and preservative treatment of poles upon their durability. This, which supplements it, gives the results of inspections of two experimental lines five and eight years, respectively, after their establishment.

The two lines, built in co-operation with the American Telephone and Telegraph Company, are known as the Warren-Buffalo line and the Poughkeepsie-Newton Square line. In the former are 1,164 30-foot chestnut poles, set between Warren, Pa., and Dayton, N. Y.; in the latter are 72 30-foot chestnut poles, set near Flanders and Morris County Junction in northern New Jersey.

PREPARATION.

The experimental poles for the Warren-Buffalo line were cut and peeled during 1902 and 1903, and delivered at stations near Thorndale, Pa., and Dover, N. J., where they were placed in single tiers on skids about two feet above the ground to season. In June and July, 1905, some were butt treated with various preservatives by the brush method, and others with coal-tar creosote by the open-tank method. The following extract from Forest Service Circular 104, "Brush and Tank Pole Treatments," by Carl G. Crawford, describes the two methods of treatment:

Brush Treatment.—It is generally conceded that the portion of a pole most subject to decay is that between 2 and 8 feet from the butt--about 20 square feet. This part fails when the remainder is still in a good state of preservation. It was, therefore, selected for treatment.[1] When the pole is set the treated portion extends 2 feet above and 4 feet below the surface of the ground. From one to three coats were applied, according to directions received from the manufacturer. Most of the preservatives were heated to a temperature of from 150 to 175 degrees F. Particular attention was paid to filling all checks and knot holes and to working the preservative into the wood, thus protecting against decay those parts most subject to attack. Careful notes were made of the condition of the poles as regards checks, knot holes, etc. The amount of preservative absorbed by each pole was accurately determined by recording the weight of the preservative before and after each treatment. The temperature of the preservative both before and after the treatment was also noted and recorded. In addition holes were bored into different parts of the treated portions of the poles, and the depth to which the preservative penetrated was closely observed.

Open-tank Treatment.—Creosote was poured into the tank until the poles were covered for a distance of about 8 feet from the butt, and was then heated to a temperature above the boiling point of water. This temperature was maintained until the air in the wood had been expanded and the water in the outer layers vaporized, and both, so far as possible, driven out. * * * The preservative was then allowed to cool, thus producing a partial vacuum by the contraction of the air and the condensation of the steam remaining in the wood. The poles remained in the cooling liquid while the preservative, under atmospheric pressure, was forced into the wood. The entire time consumed by each treatment was about 24 hours, during which the temperature of the preservative was above the boiling point of water for 8 or 9 hours.

* * * Each pole was weighed before being put into the tank and again immediately upon being taken out. In this manner the amount of preservative absorbed was determined. No account could be taken of the amount of moisture driven out of the wood during the time the preservative was heated above the boiling point of water, and, therefore, the amount actually absorbed may be slightly greater than appeared from the weights. However, since the seasoned poles were practically air dry the determinations are probably very nearly correct. In the case of the green poles, on the other hand, it is probable that the actual absorption was considerably greater than that shown.

The preservatives used, method of application, and absorption secured are given in Table 1.

PLACEMENT IN LINE.

Six hundred and thirteen treated poles, together with 551 untreated seasoned and green poles, were placed during August and September, 1905, in the line of the American Telephone & Telegraph Company, between Warren. Pa., and Buffalo, N. Y. This line extends at times along roadsides, and at others through cultivated fields, woodlots, and meadows, giving a variety of soil conditions. Table 2 shows the plan for setting the poles. Owing to difficulties in delivering the poles along the line, about 30 per cent were set with no definite plan. The number of poles of each kind is given in Table 3.

TABLE 1.—METHOD OF TREATMENT OF POLES SET IN WARREN-BUFFALO LINE.

Condition when set[1].	Preservative Used, Sold As—	Method of Treatment.	Absorption Secured per Pole. Av. Pounds.	Max. Pounds.	Min. Pounds.
Green		Untreated	...	...	...
Seasoned		Untreated	...	...	...
Seasoned	Coal tar	Brush, 1 coat	...	...	...
Seasoned	Creolin	Brush, 1 coat	3.39	4.13	2.88
Seasoned	Creolin	Brush, 2 coats	7.60	10.63	5.5
Seasoned	Wood creosote	Brush, 1 coat	2.42	3.63	1.75
Seasoned	Wood creosote	Brush, 2 coats	5.43	6.63	3.25
Seasoned	S. P. F. carbolineum	Brush, 1 coat	3.55	5.13	1.38
Seasoned	S. P. F. carbolineum	Brush, 2 coats	4.38	6.63	3.0
Seasoned	Avenarius carbolineum	Brush, 1 coat	1.98	2.25	1.18
Seasoned	Avenarius carbolineum	Brush, 2 coats	4.52	6.63	2.5
Seasoned	Coal-tar creosote	Brush, 2 coats	7.77	11.75	4.18
Seasoned	Coal-tar creosote	Open-tank	22.41	44.0	8.0
Green	Coal-tar creosote	Open-tank	15.20	39.0	4.0

[1]Describes also the condition at the time the treatment was applied.

TABLE 2.—PLAN OF SETTING EXPERIMENTAL POLES IN WARREN-BUFFALO LINE.

No. of Pole.	Condition when set.	Preservatives used, sold as—	Method of Treatment.
1	Seasoned	Avenarius carbolineum	Brush
2	Seasoned		Untreated
3	Seasoned	Avenarius carbolineum	Brush
4	Green		Untreated
5	Seasoned	S. P. F. carbolineum	Brush
6	Seasoned		Untreated
7	Seasoned	S. P. F. carbolineum	Brush
8	Green		Untreated
9	Seasoned	Coal-tar creosote	Brush
10	Seasoned		Untreated
11	Seasoned	Coal-tar creosote	Brush
12	Green		Untreated
13	Seasoned	Coal-tar creosote	Open-tank
14	Seasoned		Untreated
15	Seasoned	Coal-tar creosote	Open-tank
16	Green		Untreated
17	Seasoned	Wood creosote	Brush
18	Seasoned		Untreated
19	Seasoned	Wood creosote	Brush
20	Green		Untreated
21	Seasoned	Coal-tar creosote	Open-tank
22	Seasoned		Untreated
23	Seasoned	Coal-tar creosote	Open-tank
24	Green		Untreated
25	Seasoned	Creolin	Brush
26	Seasoned		Untreated
27	Seasoned	Creolin	Brush
28	Green		Untreated
29	Seasoned	Coal tar	Brush
30	Seasoned		Untreated
31	Seasoned	Coal tar	Brush
32	Green		Untreated
33	Green	Coal-tar creosote	Open-tank
34	Seasoned		Untreated

The above series was repeated 24 times, series No. 2 beginning with pole No. 35, series No. 3 with pole No. 69, etc.

*From United States Forest Service circular 198.

[1]It is believed at the present time that more satisfactory results will be secured by treating the entire butt to a height of from 1 to 2 feet above the ground line.

TABLE 3.—CONDITION OF EXPERIMENTAL POLES IN WARREN-BUFFALO LINE AFTER FIVE YEARS' SERVICE.

Description of poles.			Condition of poles at or near ground line.		
Condition when set.	Preservative used, sold as—	Method of treatment.	Number of poles.	Affected with decay.	Average loss in circumference at ground line.
				No.	%	inches
Green		Untreated	194	194	100.0	1.16
Seasoned		Untreated	357	355	99.4	1.01
Seasoned	Coal tar	Brush, 1 coat.	48	47	98.0	.95
Seasoned	Creolin	Brush, 1 coat.	16	16	100.0	.89
Seasoned	Creolin	Brush, 2 coats.	63	44	69.8	.42
Seasoned	Wood creosote	Brush, 1 coat.	21	20	95.2	.43
Seasoned	Wood creosote	Brush, 2 coats.	49	12	24.0	.06
Seasoned	S. P. F. carbolineum	Brush, 1 coat.	10	3	30.0	.10
Seasoned	S. P. F. carbolineum	Brush, 2 coats.	67	9	13.4	.04
Seasoned	Avenarius carbolineum	Brush, 1 coat.	8	2	25.0	.27
Seasoned	Avenarius carbolineum	Brush, 2 coats.	66	9	13.6	.04
Seasoned	Coal-tar creosote.	Brush, 2 coats.	83	12	14.5	.02
Green	Coal-tar creosote.	Open tank.	29	0	.0	.0
Seasoned	Coal-tar creosote.					.05 Negligible

METHOD OF INSPECTION.

Five years after placement the poles were inspected by representatives of the American Telephone & Telegraph Company, the Bureau of Entomology, and the Forest Service.[1] The method of inspection was as follows:

After the soil was removed from the base of each pole to a depth of from 6 inches to one foot the circumference was measured at or close to the ground line. Since this measurement was made to determine the original circumference of the pole, which, unfortunately, had not been measured when the poles were set, the proper point at which to take the measurement was carefully selected. If loss by decay impaired the accuracy of the measurement, proper allowance was made in the figures recorded.

After the first measurement the pole was carefully examined with hatchet and prod for decay or insect injury. Decayed portions of the poles, if of any extent, were removed with the hatchet, and a second measurement of circumference was then made at the point of greatest decay. This was usually found to be at or near the point selected for the first measurement. Poles which appeared to be unaffected by decay, but which rang hollow when struck with a hatchet, were bored to determine how far decay had actually progressed. After inspection creosoted plugs were driven into the poles and the soil which had been removed from about the poles was replaced.

COMPUTATION OF DATA.

The per cent of each class of poles affected with decay at or near the ground line and the average loss of circumference at that point were computed. In most cases the latter could be determined by averaging for all poles in the class the differences between the two circumference measurements for each pole. Often, however, the extent and position of the decayed area were such that the two measurements showed no appreciable difference. In other cases decay in the treated zone was confined to cant-hook or other mechanical scars. For a fair comparison, therefore, it was necessary to make allowance for such conditions, and the following procedure was carried out:

(1) Where decay at or near the ground line was so situated that the measurements of circumference with and without the decayed portions showed little or no difference, an appropriate loss of circumference was assumed. This assumed loss was determined by the amount and situation of the decay according to tables of the American Telephone & Telegraph Company.

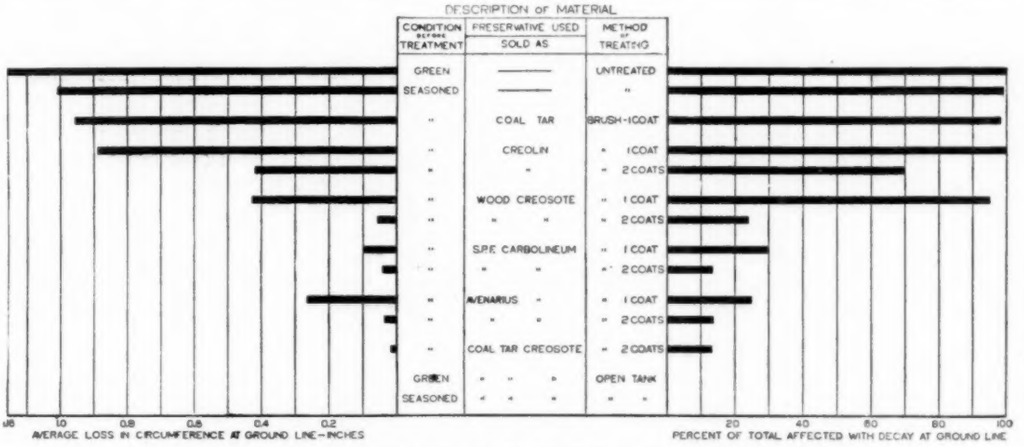


Fig. 1.—Condition of experimental poles in Warren-Buffalo line 5 years after placement.

(2) For every pole showing signs of decay at the ground line a loss of circumference of one-eighth inch or more was recorded.

(3) In one set of computations those poles which showed decay due only to mechanical injury were considered as sound. The results, however, were so similar to those obtained when all poles which showed decay at the ground line were considered that only the latter ones are given.

CONDITION OF EXPERIMENTAL POLES.

Table 3 gives, for each class of poles, the per cent affected with decay and the average loss in circumference at the ground line. Figure 1 presents the same data in graphic form. The more significant results will be summarized later. For a proper valuation of these results the following points should be noted:

The comparatively small number of poles treated with only one coat of some of the preservatives renders the results in their case less conclusive than where two coats were used.

Analyses made by the American Telephone & Telegraph Company of two samples of creolin showed a

[1]The members of the inspection party were: R. F. Horsford and C. E. Taylor, American Telephone & Telegraph Co.; T. E. Snyder, Bureau of Entomology, U. S. Department of Agriculture, and C. P. Winslow, Forest Service. Mr. Horsford and Mr. Snyder were present at the inspection of only some of the poles.

water content, respectively, of 20 and 90 per cent. So great a variation in composition must detract, of course, from the value of the test, so far as this preservative is concerned.

Aside from decay at the ground line, the condition of the experimental poles at the time of inspection was good. Many were slightly affected with sap rot in portions not influenced by soil moisture, and from some the outer fibers were peeling off. These trivial defects, however, were not influenced by the preservative. Decay in the treated zone rarely extended more than six inches above the ground line. Occasionally some was found in hollow knots above this point. Poles thus affected, however, are not included among those classed as showing decay. Insect damage to poles is discussed later.[1]

EXPERIMENTAL POLES IN THE POUGHKEEPSIE-NEWTON SQUARE LINE.

The results from this experimental line are not as conclusive as those from the one just described. Only 72 poles were placed, and records showing the details of their preparation and treatment are not available. Table 4 gives the number of poles of each class and their average loss of circumference at the ground line. Figure 2 shows the same data in graphic form.

The poles were inspected in July, 1910, approximately eight years after placement.[2] In general the method of inspection was the same as that for the War-

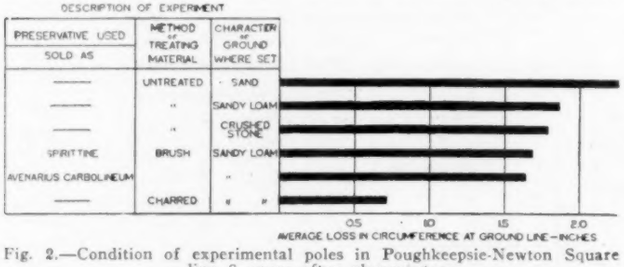


Fig. 2.—Condition of experimental poles in Poughkeepsie-Newton Square line 8 years after placement.

ren-Buffalo line, except that the decayed portions near the ground line were first removed after which three circumference measurements were made, one 5 feet above the ground line, one 6 inches above, and one 6 inches below. To compute the average loss in circumference at the ground line the average taper per linear foot was obtained by dividing the difference between the circumference 5 feet above the ground line and that 6 inches above by 4.5, and the result added to the difference between the circumference 6 inches above the ground line and that 6 inches below.

TABLE 4.—DESCRIPTION OF POLES SET IN THE POUGHKEEPSIE-NEWTON SQUARE LINE AND THEIR AVERAGE LOSS IN CIRCUMFERENCE AFTER EIGHT YEARS' SERVICE.

Total No. of Poles.	Preservative used, sold as—	Method of Treating.	Character of ground in which set.	Average loss in circumference at ground inches
10	.....	**Untreated**	Sand	2.27
28	.....	Untreated	Sandy loam	1.87
8	.....	Untreated	Crushed stone	1.77
11	Spiritine	Brush....	Sandy loam	1.68
10	Avenarius carbolineum	Brush....	Sandy loam	1.63
5	.....	Charred..	Sandy loam	0.71

[1]Notes on damage by insects to the poles in this and the Poughkeepsie-Newton Square line are given in Bureau of Entomology Bulletin 94, Part I, "Damage to Chestnut Telephone and Telegraph Poles by Wood-Boring Insects," by T. E. Snyder. Further information regarding damage to poles by insects is contained in Bureau of Entomology Circular 134, "Damage to Telephone and Telegraph Poles by Wood-Boring Insects," by the same author.

[2]The inspection was made by R. F. Hosford, F. O. Mackey, A. W. May, and H. G. Spohr for the American Telephone & Telegraph Company, T. E. Snyder for the Bureau of Entomology, United States Department of Agriculture, and H. F. Weiss for the Forest Service.

SUMMARY OF RESULTS OF INSPECTION OF EXPERIMENTAL POLES.

POLES IN WARREN-BUFFALO LINE.

(1) Both the green and seasoned poles butt-treated with coal-tar creosote by the open-tank process showed practically no decay at or near the ground line.

(2) The poles brush treated with two coats of coal-tar creosote, and preservatives sold as Avenarius carbolineum, S. P. F. carbolineum, and wood creosote, showed but little difference in the extent of decay. Their average loss of circumference was 0.02, 0.04, 0.04, and 0.06 inch, and the per cent affected with decay 14.5, 13.6, 13.4, and 24.0, respectively. The condition of these poles was next best to that of those treated with coal-tar creosote in the open tank.

(3) The poles brush treated, respectively, with one coat of preservatives sold as S. P. F. carbolineum and Avenarius carbolineum showed a much greater loss of circumference at the ground line than those treated with two coats of these preservatives. The average losses of circumference were 0.10 inch and 0.27 inch, and the per cent affected with decay 30 and 25, respectively.

(4) The poles brush treated with two coats of preservative sold as creolin and those similarly treated with one coat of preservative sold as wood creosote showed but slight difference in loss of circumference at the ground line, the average loss being 0.42 and 0.43 inch, and the per cent affected with decay 69.8 and 95.2, respectively.

(5) The poles brush treated, respectively, with one coat of preservatives sold as creolin and coal tar, showed a loss of circumference at the ground line of 0.89 and 0.95 inch, and a per cent affected with decay of 100 and 98, respectively. The loss with these poles was nearly as great as with the untreated.

(6) The untreated poles were practically all more or less affected with decay at the ground line, the average loss of circumference for those seasoned prior to placement being 1.01 inches, and for those placed green 1.16 inches. That two of those seasoned prior to placement showed no decay at or near the ground line is possibly due to the fact that they were both set on a hillside or slope where the drainage was excellent. One of them was set in broken stone and rock.

(7) The reference in Bureau of Entomology Bulletin 94, Part I, pages 9-10, to insect damage to poles in this line is as follows:

All these treatments, except the brush treatments with creolin and tar, were efficient in preventing the attacks of wood-boring insects, at least for a five-year period, in this northern climate. There was but little damage by insects to the poles in this test line. The most common injury to the untreated poles was by the large black carpenter ants which widen the longitudinal weathering checks, and hence induce more rapid decay. The work of the chestnut telephone-pole borer was found in several poles, and this beetle was evidently just beginning to attack these poles.

POLES IN POUGHKEEPSIE-NEWTON SQUARE LINE.

(1) The untreated poles set in crushed stone showed less decay at the ground line than similar poles set in sand, the average loss of circumference at that point being 1.77 inches and 2.27 inches, respectively.

(2) The poles with charred butts showed less decay at the ground line than similar uncharred and untreated poles set in either crushed stone or sand, their average loss in circumference at the ground being only 0.71 inch.

Who's Who in the Telephone Game

Facts and Fancies About a Man You Know or Ought to Know

OF COURSE, you've heard the song, "I'm the Guy." It tickled you. You saw and heard the gazink who put the pit in Pittsburgh and the rock in Rockford. But did you ever see a portrait of the man who keeps the Ed in Edwin and the Ruth in Ruthven and the Hard in Harding? You never. It has taken ten years to drag Ed Harding into print. During those years he has grown corpulent and his hair has thinned out on his dome. Oh, he's the guy who knows what the hard in Harding stands for. Harding is hard. He has trained for it. His near friends call him Old Divine Right!

But at that, he isn't so bad.

E. R. Harding is vice-president of the Holtzer-Cabot Electric Company, in charge of the western office. It you ever get to Chicago, take a south-bound State street car and ask the conductor to put you off in front of the door. Don't get excited about never getting there. With patience you will get through and it only costs a nickel. If this doesn't sound good, send a card ahead telling when you will arrive at the depot and Skip will meet you with his Cadillac. Skip is short for Edwin Ruthven. He got the name when he used to wade in the ocean and go out to meet his dad in a dingey. Being born in Maine you have such pastime thrust upon you. The salt air and fog is responsible for the color of Skip's hair and its thin spots. At any rate, this meeting you with a machine is part of the program—whether you have an order in your pocket or not. And really, you should see how nicely the v.-p. is fixed—way out there on South State street. New building; monogram done in tile in the lobby; nice iron stairs and heavy oak balustrades; green velour carpets and mahogany furnishings; brass cuspidors and leather couches; a real library—books that have followed Harding all through his life from the school room to now.

Old Divine Right.

Of course, he taught school. Everybody who was born in Maine does that. You see, Harding's parents—everybody calls him Harding—were English. It naturally follows that his grandparents were English. They were, with the exception of one grandmother. But Harding, himself, is straight Bull Moose. He has learned what it means to dig. He never looks back. He doesn't open his mail when he is behind with his orders. He has been fleeced a time or two, but he isn't easy—far be it from. Nothing despondent about him when he tops the ball. You will find him up front—never on the back seats.

E. R. Harding's education gave him some letters, both Roman and Greek. He attended the common schools at Hampden, Maine, the town that marks his birthplace. He went through the Hampden Academy and then completed the full course in the Waterville Classical Institute. From Waterville, he went to Pittsfield Central Institute, from which he graduated. Added to all this, was four years in Bowdoin College, from which he graduated in 1885 with the A. B. degree. He went back there, three years later and got his A. M. Then he became principal of the Patten Academy, 1885-87. Up to this time Maine was Maine with Harding. He had only been out of it when he went to sea. But teaching had hold of him and he accepted a call to the principalship of the Winthrop (Mass.) High School, where he remained until 1891. No one has found out how he switched from Winthrop and his long frock coat to Chicago and the Edison General Electric Company's sales force. Maybe it was the World's Fair, but no matter, he was in the sales engineering staff until 1894, when he joined the Ansonia Electric Company, having charge of the motor department. He remained in this place until 1896, when he formed a partnership as manufacturers' agent. This firm was styled Harding & Hammer! Can you beat that for a hard combination? You cannot! The concern handled the Holtzer-Cabot Electric Company's complete line of goods. It lasted two years and accomplished two essential things by putting E. R. Harding into the telephone business and into the H.-C. Company.

Edwin R. Harding celebrated his fiftieth birthday, Sunday, September 29. This sketch is remarkable because it is the most that was ever devoted to the subject. It has touched the high spots without any fancy work. Harding believes in rules, regulations and revolutions designed to dignify and advance labor and the laborer. He has a highly efficient organization that does all the work—along the lines of Harding's plan. Harding tries hard and succeeds admirably in encouraging

and helping his associates. There is no apathy in his routine; nothing to stifle ambition. His training in the school room and his experience in selling has brought him up through the ranks with broad understandings. Harding is hard only in your imagination. He isn't violent—except when he plays golf. If he would only use his wooden clubs he would do better, but he sticks to the irons. His special pet is the putter and every now and then he holes out, two or three down—always with a smile.

Commission Laws Analyzed

New York public service commissioners are the best paid in the country; they receive $15,000 per year each. South Dakota commissioners receive least of all, their salaries being $1,500 a year. Members of the other forty-five state commissions and one Federal Commission receive between $1,900 and $10,000 per year. These commissions have in the aggregate no less than 156 members.

This and other information regarding the organization of commissions is contained in a pamphlet recently issued for confidential circulation by the Department on Regulation of Interstate and Municipal Utilities of the National Civic Federation, of which Emerson McMillin is chairman. It is part of the compilation and analysis of public utility regulation laws which is being prepared in connection with the investigation of public utility regulation in this country. The compilation of the laws is expected to be published about the first of the year as a part of the report of the department on its investigation.

The membership of all the commissions with the exception of five is three. The interstate commerce commission has seven members and the California, Georgia, and two New York commissions have five members each. In the case of twenty-six of the commissions the members are appointed. Of the remaining twenty-three they are elected. The terms of office range from two to seven years. The members of twenty-eight of the commissions hold office for six years; of three for five years; of six for four years; of seven for three years; and of three for two years. The members of the interstate commerce commission hold office for seven years.

Stringent rules govern the relations of members and employes of commission with public utilities. In many cases the holding of an interest in any such utility is a disqualification for membership. A commissioner usually is debarred from accepting any gift, gratuity, emolument or employment from any railroad or other public utility, except in some cases passes for use when engaged on official business. In many jurisdictions members, or employees, or both, are authorized to pass free on railroads while in performance of their duties.

In twenty-eight jurisdictions no member, officer or employee of the commission is allowed to engage in any other business, employment or vocation or hold any other political office. The statutes sometimes provide that members shall devote all of their time to the duties of their office and in other cases that they shall devote as much time as may be necessary. Several of the states provide for the assessment of the costs of conducting the commissions to the utilities which are under the jurisdiction of the commissions. This is usually done on a gross earnings basis.

The director of the investigation, John H. Gray, says, "In this part of our compilation we have gathered together all of the material found in the statute books relating to the organization and constitution of central commissions. This legislation is voluminous and its condensation and analysis has entailed a large amount of time and painstaking effort. It has been distributed to friends of the department and other interested persons, subject to final revision at a later date. We expect the compilation and analysis of public utility regulation laws to be extremely valuable to all who may be interested in the regulation by state authority of public utilities in any part of the country. It will be especially valuable to members of legislatures."

New York Submarine Cables are Many

The main borough of New York City—Manhattan—being situated on an island, telephone submarine cables must necessarily be used as a link in the means of communication with the rest of the country. There are now sixty-three armored submarine telephone cables leading from Manhattan Island in all directions, with a total number of pairs of conductors of 10,684. In addition, there are three cables laid in the subways of the Pennsylvania Railroad and five cables in a telephone subway across the Harlem River, which total 2,877 pairs. This makes seventy-one cables and 13,561 pairs of conductors (27,122 wires) passing under the North, East and Harlem Rivers. In laying these submarine cables the utmost care must be exercised not to have them cross each other. They must occupy the same relative positions in the cable houses on each side of the river. By being chained as low as possible there is little slack for an anchor to catch, and the cable is far enough from the surface to avoid being caught by a steamer or tug propeller.

Sound-Proof Telephone Booths

Really sound-proof telephone booths are now constructed by a German firm and, owing to the new principle which is used in their makeup, it is said that not the least sound can escape from them while the telephone is being used. The walls of the new booth are built of five layers of thin wood, with the grain crossed each time, and the layers are glued together, and then the whole is covered with a special sound-proof compound, so that in this way it is not required to use deadening cushions as a lining for the booth. As the whole is made in six dismountable panels, a booth can be set up in a very short time, and the panels are not too large to be taken in through an ordinary door. Insulated openings are left in the partitions beforehand, so that there is no need of boring holes in order to put in telephone or electric light wires.

Government Paying Telephone Bills

All telephone service in the homes of government officials can be paid by the government up to August 23, the day of the passage of the legislative bill forbidding the payment from government funds of telephone charges, where the telephones are in the homes of officials. A decision to this effect was made by the comptroller of the treasury in an allowance of accounts for various such telephones under the Treasury Department, including one in the home of the director of the hygienic laboratory. Bills to the very day of the passage of the act will be allowed.

Familiarizing the Public with Long Distance

By E. H. Havens

THERE are two kinds of communication,—near and distant. For both of them the mails and messenger service—representing the older types—are used. Among the newer forms are the telegraph and the telephone, mentioned in the order of their invention.

As is generally known, the development of the telegraph has always been confined to communication at a distance. One reason for this is the fact that the mails and messenger service were considered quick enough for local use. The successive reductions in postal rates have resulted in limiting the number of distant communications carried by all other means to a small percentage of those borne by the mails. With the exception of the newspaper service, the great bulk of telegraph messages were confined to a few business hours. The lines and equipment were largely unproductive during the rest of the twenty-four hour day.

Recently, however, plans were developed to distribute this telegraph traffic more evenly. New organizations were perfected and advertising campaigns inaugurated to acquaint the public with the desirability of intrusting communications formerly mailed to the telegraph service. Success was almost immediate.

To overcome the natural hesitancy on the public's part in "sitting down and writing out" a telegram, it was made possible to telephone it to a telegraph clerk. Thus another objection was met and telegraph messages are now growing more common daily.

The minimum amount for which telegraph service can equitably be furnished has been another reason for restricting its general use to *distant* communication. For *local* use messengers have long ago been replaced and now the mails are gradually being discarded for the telephone. This is particularly true in the United States, where approximately 59 per cent of our communications are by telephone as compared with about 41 per cent by mail.

To spread this local popularity of the telephone to long distance use is the problem for solution. The most logical method of procedure is to determine the serious objections on the part of the public to its general adoption.

Foremost among these is the barrier of dread. If anyone of the so-called public were asked why he does not use the telephone for out-of-town needs, he might promptly reply, "On account of its cost." If the subject were discussed he would probably say that the rates limit such messages to the most important ones such as serious news, decisions and announcements. For social purposes, therefore, the telegraph service is utilized where the mails are not sufficiently quick. Aside from business use a long distance telephone message is liable to cause a shock and the only reason why the statement is not equally true of telegrams, is that the recent changes in transmission of letters has tended somewhat toward surmounting this difficulty.

VISIT OFFICES.

It seems necessary, therefore, to make the public more familiar with the inner workings of the telephone business; so to impress the methods of receiving and handling out-of-town traffic that this "open sesame" will present itself to everyone as soon as the need for such communication shall arise. Urge the public—particularly the women, who expend approximately 75 per cent of all family incomes—to visit the long distance as well as the local telephone central offices. The welcome may be extended through general advertising media and strengthened by personal invitations sent direct by the local representatives. The invitations should be methodically sent out and followed up with evidences of personal interest as a part of each day's work.

WINDOW DISPLAYS.

The passersby are invited by window displays to learn how sweetmeats and tempting dishes are prepared and are indirectly induced to purchase. In the same way a familiarity with the speed, sureness and ease of telephoning distant as well as local communications will redound to the good of everyone. Such publicity may also be easily and inexpensively obtained through the efforts of local commercial department representatives.

EDUCATIONAL ADVERTISING.

The broad policy of present national advertising might well be directed partly toward the human interest element of long distant visits. The expense and inconvenience of travel might, in a negative way, be impressed in various advertisements provided the positive side of the pleasure to be obtained be emphasized. "Particular person" calls and other details could be clearly brought out in these educational bulletins. Those who would be most interested in this service are now ignorant of such matters.

Familiarity with telegraphed letters is rapidly overcoming all dread formerly so coupled with the receipt of residence telegrams. In the same way acquaintanceship with the long distance telephone and its workings will result in its general use. Shyness among children is a most natural trait. With lower animals it is termed timidity. With men and women it is characterized as a disinclination to become acquainted—whether it be with people, new localities or devices to aid in accomplishments.

The public now displays the same hesitancy in receiving or sending distant messages by telephone that it formerly showed when the service was new. Then the telephone backers were engaged in solving dozens of problems where they now have one.

The rates for long distance telephone service have less to do with the public's lighter use of it than has the lack of familiarity in the meantime, while mechanical problems are being developed so that the cost of furnishing this service may be lower, the most feasible plan of spreading its use is by the fundamental plan as that used by the telegraph company, namely, publicity.

With its wide field and well organized forces the telephone company, which reaches everywhere, can accomplish even greater success. The quickest method is publicity.

The Department of Communications of Japan has decided to lay a submarine telephone cable between Aomori and Hakodate.

New York Commission News

The Metropolitan Telephone and Telegraph Company of New York City had a hearing before the New York Public Service Commission, second district, on its complaint as to refusal of the New York Telephone Company to furnish it with telephone service and list its name in the directory. At the outset, Chairman Stevens asked Vice-President H. Lee Sellers, representing the company, why it had not applied to the commission for a certificate of public convenience and necessity and for permission to issue $10,000 in capital stock which is outstanding. Mr. Sellers answered that the company had not as yet commenced any operations in New York and that this amount of stock had been issued in ignorance of the law to a parent corporation, a company of the same name incorporated under the laws of the state of Delaware with a capital stock of $3,000,000. This latter company is now building in Ohio, and Mr. Sellers said the ultimate scheme was to maintain a telephone and telegraph system between New York City and Chicago.

The chairman pointed out to Mr. Sellers the mandatory requirements of the statute as to the commission's approval of stock issued by telegraph corporations for any purpose. Mr. Sellers agreed to promptly call a meeting of the company's directors in order that appropriate action might be taken to call in the stock issued and then file the necessary application with the commission.

For the New York Telephone Company, T. P. Sylvan, assistant to the vice-president, based its refusal to supply service to the Metropolitan Company on the ground that such company was created solely for the purpose of selling securities on the credit of a company of the same name, which was succeeded by the New York Telephone Company in 1896.

At this time Mr. Sylvan stated there were outstanding $1,500,000 of mortgage bonds of the former Metropolitan Telephone & Telegraph Company, which indebtedness now runs to the New York Telephone Company. Mr. Sylvan contended that its practical existence had not terminated, although it had legally ceased as a corporation. This position was held by him after his admission that the old company did not now maintain offices and had no listing in the New York City telephone directory.

The commission ordered the New York Telephone Company to furnish telephone service to the Metropolitan Telegraph and Telephone Company at its offices, No. 135 East 16th street, upon the complainant complying with all the reasonable rules and regulations of the company and making payment for such service one month in advance. It also ordered the New York Telephone Company to place the name of the complainant in its directory of subscribers about to be published, in the usual manner in which subscribers' names are placed in such directory, together with the office address of the company and its telephone number. The resolution of the commission recites that the complainant is a corporation incorporated under the laws of the state of New York as a telegraph and telephone company; that it has not as yet secured a certificate of public convenience and a necessity from this commission entitling it to construct its plant in the state of New York, but that it has opened offices in New York, and desires telephone service from the New York Telephone Company, which is the sole company affording telephone service in that city. It further undisputedly appears that the New York Telephone Company has refused to afford service, although the complainant is ready to comply with all the reasonable rules and regulations of the New York Telephone Company and pay its regular schedule of rates and charges for the service which it desires. The order further recites that the New York Telephone Company has not presented to the commission any satisfactory or reasonable reason for its refusal to afford service to the complainant. It appeared upon the hearing by admission of the complainant that it had unlawfully issued its capital stock to the amount of $10,000 without applying to the commission for authorization so to do; but pursuant to the suggestion of the commission it has since caused the stock to be returned to the company and been canceled, so that it has corrected this violation of law so far as it lies within its power at the present time.

The Federal Telephone and Telegraph Company, which owns a majority interest in the Rochester Telephone Company, has issued the following statement to the commission in regard to free service given by the Federal Telephone and Telegraph Company to a few of its patrons:

"Since telephone companies have been under the control of the Public Service Commission no telephones have been installed free by the Federal Telephone and Telegraph Company. At the time the Public Service Commission's powers were extended to include telephone companies, this company had no free list, so-called, the majority of people who were not paying being those who had done work of various kinds for the company, the company showing its gratitude in this way. During the construction period in building our exchange and long distance lines throughout western New York, we received from numerous people many favors which were worth considerable money to us. This work was done in connection with getting ourselves established in new communities to which our lines were extended, and our appreciation of their work was shown by temporarily giving them free telephones. For the last two years we have been eliminating this free service and, in fact, previous to the receipt of your order, we had cleaned up the worst situation we had with the exception of one telephone. The company has no free list, generally speaking. Even the directors pay for their telephones as well as the president. There is no one who has the free use of our long distance lines. Even employes using them on matters other than the company's business have to pay for the services the same as any subscriber. We have at the present time probably, not over one hundred free telephones in a total list of upwards of 65,000 telephones owned and operated by companies which we control."

The commission has begun an investigation into the rates at Buffalo, N. Y., on complaint of the city, the sessions being held in the Buffalo city hall.

The commission has authorized the Black River Telephone Company to issue its second-mortgage bonds to the amount of $50,000. The bonds are to be sold at not less than 94, and the proceeds used solely for the purpose of retiring the $50,000 of first-mortgage bonds due and payable on January 1, 1913.

Telephone Growth Great in Saskatchewan

It is scarcely more than three years, says a report from Regina, Saskatchewan, Canada, since the government started in the telephone business, and at that time there were fewer than 500 miles of long distance telephone lines and no rural systems. The government, having thoroughly investigated the situation, bought out existing lines and went into the business itself. Today the province has more than 2,000 miles of long distance lines owned and operated by the government, together with seventy-six local exchanges and 132 toll offices. There also are nearly 7,000 miles of rural systems owned and operated by the farmers and giving telephone service to nearly 7,500 homes.

Digest of Foreign Telephone Literature

Translated for Our Readers

A NEW TYPE OF TELEPHONE SERVICE.

IN the larger cities the telephone subscribers are either connected to one general exchange, so that all of the connections are made from this one plant, or else they are connected to a number of exchanges situated in different parts of the city. Where a very large number of subscribers is to be connected, the first method is of course out of the question. Thus, for example, a city like New York could not house all of its operators and switchboards in one building. Even smaller cities would find some trouble in this method. Hamburg perhaps affords a more interesting example in this respect than any other city, since its telephone exchange connects more than 80,000 subscribers.

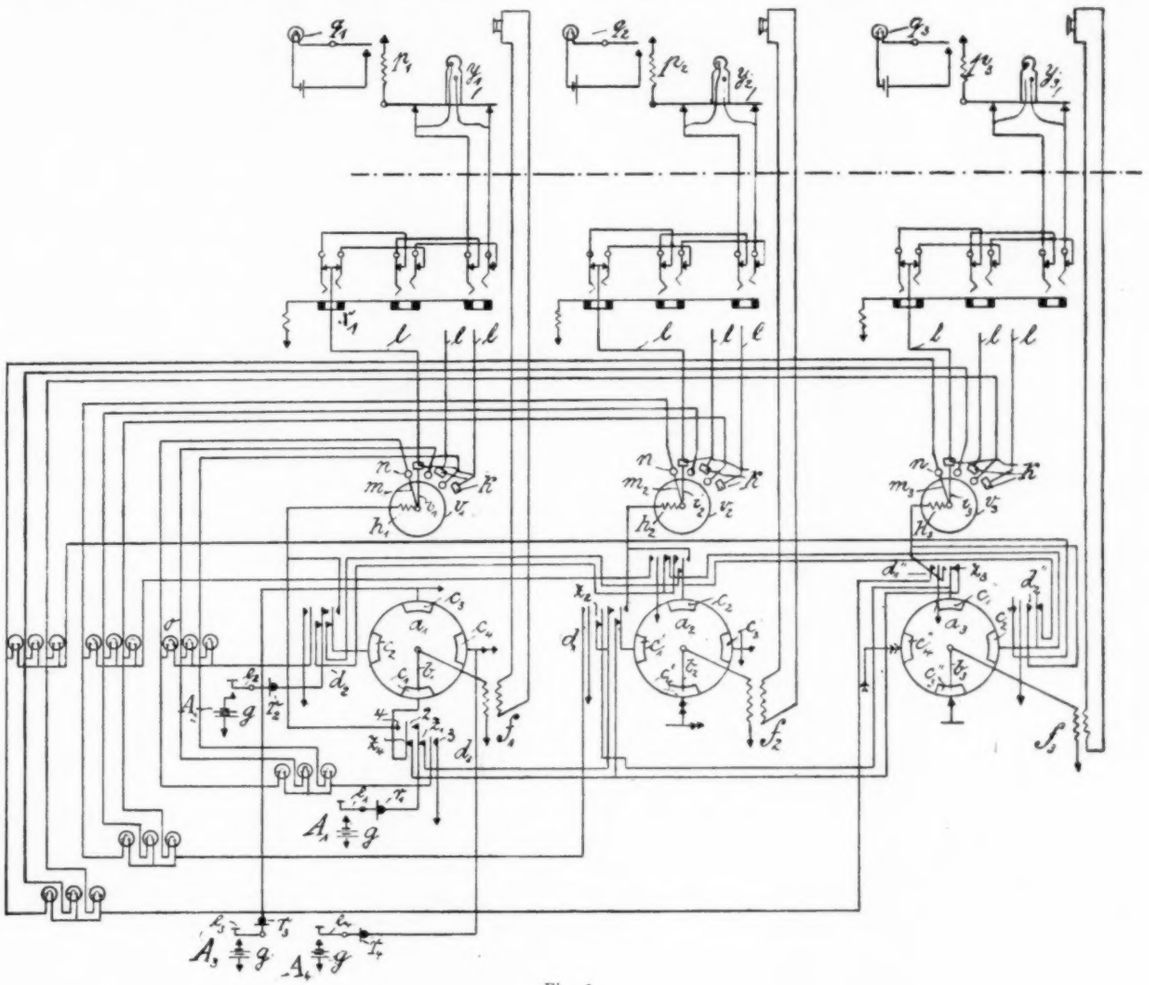


Fig. 1.

The systems using the one central exchange only may be run in one of two ways. They may work with the simple multiple switchboard system, in which any subscriber can call up any desired number by using the services of one single operator, or else the exchange is subdivided into groups where the subscribers within one group can connect with any other subscriber of that group by using the services of their own group operator, whereas they have to use two operators if they wish to speak to a subscriber in another group. This second type of operation is about the same as the operation in different exchanges, except that the exchanges are housed in a single building instead of being scattered over a larger area. Recent years have, however, left the first system and turned to the second system, so that most exchanges or groups hardly try to connect more than 10,000 subscribers within their own exchange system. Since this latter system is of such importance in present telephone practice, it may not be out of place to give a short résumé of its operation. Every group of A-operators (operators who convey calls for other exchanges to the latter) have a corresponding group of B-operators in the other exchanges, who receive these calls and make the proper connections. The operation is perhaps as follows: The subscriber calls his exchange, the A-operator receives the call, and calls up the de-

sired exchange, giving the B-operator, who is always listening for calls, the number. The latter selects an open wire, and gives the number of this wire to the A-operator. The latter plugs this line, and the B-operator connects this wire with the desired subscriber's line. This process of connection has some serious disadvantages.

Since a number of A-operators use the same exchange wire connecting with the B-operator, it follows necessarily that the B-operator in the second exchange is called up by more than one operator simultaneously. The result is that the calls coming from the A-operators are only heard in part, that they must be repeated, and that confusion is inevitable. The A-operators have to wait their turn for connections, and time is wasted on every side. If there are wrong connections, still more time is lost in correcting errors.

The selection and communication of the number of service wire from B to A-operator takes about one to two seconds additional time, and while this time when taken alone is not much, it amounts to a serious loss of time when we add up the numerous calls received and answered per hour. An additional loss of time is caused by the few seconds elapsing when the A-operator looks for the proper jack of the line given to her by the B-operator. The distribution of calls in a given system of A and B-operators is a matter of accident and very irregular in the long run. The result of this uncertainty is that the exchanges must install a larger number of wires and lines than is absolutely necessary from the standpoint of the number of connections. Taking all these drawbacks and summing them up, we get a resulting operation that in its total efficiency is far behind that of the single exchange system. Moreover, we will find in following these disadvantages that they can be remedied to a large extent, thus assuring the subscriber of better service.

First of all there is the constant attention which the B-operator has to pay to possible calls from the A-operator. If we consider the case closely we will find that this close, incessant attention is not at all necessary. All that is needed is the attention of the B-operator to one A-operator only. After this operator is through, the B-operator can turn her attention to the second A-operator, and so on. In other words her attention need only be directed to the call of one operator at a time, since she can answer this one call only and no more. This would do away with the possibility of mistakes arising from the fact that more than one A-operator can call the B-operator at the same time.

The second disadvantage of the oral announcement of free service lines can also be eliminated. If we have the one-operator system, the A-operator can choose one of the free lines and use this one exclusively until her call is finished. There is then no necessity of the B-operator calling off the free service line of the A-operator, and the latter looking for the right plug on her switchboarl. Much time is therefore saved. The simultaneous announcement of the open wire to both operators will go on with such speed, that the two service lines can be plugged while the A-operator is giving the desired number of the B-operator. The operator can immediately test the desired line and make connections if the latter is open. The saving in time amounts to about one-third second per call, since most calls have from three to five syllables, and at least one interchange of call-number question and answer between operators is avoided under the new system.

The uneven distribution of calls on B-operators can also be avoided. If every A-operator has the opportunity of calling a B-operator say once every one-half second, and need not wait for the completion of her call, we have a saving of time, which will mean more uniform and more efficient service than is possible under the present system. If, for example, we have four A-operators, and operator A1 can call operator B1 in the first quarter second, operator B2 in the second quarter of a second, operator B3 in the third quarter, and operator B4 in the last quarter, and if this is repeated for every A-operator, we can get the maximum service in a minimum of time. The number of service lines for the efficient operation of the exchange can also be restricted to a minimum. If we add up the possible advantages in an improved system, we will be able to get a saving of about 20 to 30 per cent in time and about 50 per cent better service.

Figure 1 gives a fair idea of the wiring system, and a brief explanation will probably suffice. The most important point is the use of a pair of rotating switches, which are used by the A-operators and the corresponding B-operators in the second exchange. During each rotation, the switches allow every operator of a group to call upon the corresponding operator of the B-group and have her make the desired connections. Meanwhile the second switch of the rotating pair of switches selects an open service wire and announces it simultaneously to both A- and B-operators.

In Fig. 1, a_1, a_2, a_3, are switches to be placed near the B-operators in any position, having rotating arms or segments, which always retain the same relative position to each other. The outer ends of these arms glide over metal segments, c_1, c_2, c_3 (d_1, d_2, d_3), are springs carrying the metal segments which latter are connected to the listening keys of the B-operators. The inner ends of the arms b_1, b_2, b_3, are each connected to an electromagnet (f_1, f_2, f_3), whose inner windings are grounded at one end. If an A-operator presses a calling key, at a moment when one of the arms b touches the segment connected with that key, a current flows from a battery g, by way of the key in question, then to a microphone, r_1, through the contacts z_1, z_2, z_3, z_4, and then to the segment c_1, the arm b_1 and the corresponding electromagnet F_1. The latter is excited and holds the contact between its arm b_1 and the metal segment c_1, which has been touched. The microphone being in circuit, and a repeating coil being used, the desired number is transmitted from the A- to the B-operator. The arm b_1, being now stationary, breaks the connection of the key c_1 of the A-operator with the two other switches a at contact z_1, and the electromagnet f is kept excited by a current (g, el, rl, 2 cl, bl, fl) and earth g. The current of the battery is at the same time conducted to the electromagnet hl of the proper switch vl by way of the now closed contacts 2, 4, which in turn conducts it to the segments k by means of a rotating arm il. Service lines or wires 1 are connected to the segments k which former lead to the B-operator's switchboard. If now arm il touches segment k with its end, which is connected to an open wire, a current will result, which excites the elecromagnet $h1$ and the arm $i1$ remains stationary on the segment k corresponding to the service line chosen. At the same time a connected arm $m1$ has sent current through a call lamp o which lights up, showing the A-operator what service line is open, without any work on the part of the B-

operator. The call lamp current circuit is the following: *g, c1, r1, 2, 4, h1, m1, n, o, 3,* earth *g*. At the B-operator's switchboard, the call current excites the relay *p1* and lights up a signal lamp *y1*, showing the B-operator the open line without any trouble on her part. If the operator plugs a jack *x1*, the connecting line breaks its contact with earth, and the electromagnet becomes without current, and the arms *i1* and *m1* take up the rotating motion again. The lamps *o* and *q* are extinguished. Since the switch rotates at a speed of about one revolution per second, the line is announced free almost immediately after the plugging of a jack or the pressure on a calling key, and the line is ready for a second call, while the number is being given to the B-operator. As soon as the A-operator has announced the number of the B-operator, and released her jack, the current in the electromagnet *f1* is interrupted. The corresponding arm *b* may be in the corresponding position with the other rotating arms, or not. If the former is the case, it begins rotation at once, immediately coupling with the constantly rotating axis. If it is in the second position, it waits until it reaches the position necessary for coupling with the rotating axis, which is done by a mechanical movement. One or more of the switches may be stationary, that is, in use. But as they are used and released in rotation, the operator need not watch them, and need only glance at the signal lamps to find out what switches are open and what B-operators are not busy. The call keys with battery, microphone and signal lamps form a unit which is entirely independent of the electromagnetic units. None of the call keys belongs to any B-operator exclusively; none of the A-operators are obliged to call a definie B-operator. But the rotation of the switches determines the connections between B- and A-operators regardless of the choice of either group of operators.—*Zeit. f. Schwachstrom.*

SOME QUESTIONS IN AUTOMATIC TELEPHONE SERVICE.

There have been many comparisons between the automatic and the manual telephone systems, many of them from the purely technical standpoint, many from the psychological standpoint. Some engineers claimed that it was asking a little too much of the public to select its own telephone connections by means of the selector systems, rather than have trained operators do this selecting. This objection has evidently not been upheld in practice and can therefore be eliminated. There is one question, however, which has usually been neglected in discussing the two systems, and that is the economic standpoint, from the side of intricate machinery and precision instruments and relative usage in practice.

If we consider the work of the operator in the manual system, we find it to consist of three separate operations, namely, receiving the call; then the testing of the desired line, making connections, watching proper operation of the service; and finally, disconnecting the connections. The first and last tasks are merely mechanical, and can easily be fulfilled by some mechanical arrangement.

The operator in manual service makes and then breaks connections. She is only connected in the call circuit during the short time needed for making inquiries as to call numbers and, if necessary, repeating this request to avoid mistakes. This operation lasts from one-quarter to one-half a minute at most. To control the connection she glances at the call lamps at times, and perhaps doses the listening key once or twice to assure herself of the proper working of the connection. This time requires only a few seconds, and the rest of the time she is ready for any other calls that may come in. The automatic mechanism is used only the shortest possible time. The rest of the time they are merely used to keep the connection between the two subscribers, which is not a difficult or complicated task.

Take the Siemens-Strowger selector. Its purpose is to select a free selector group and to connect the subscriber with it. For this purpose it requires complex and accurate construction. To select the open line, the selector needs about one-half second. Suppose about ten calls a day are made without hitch or interruption, talking at the average rate of three minutes. That would give about 10 to 20 seconds to the selector for making the group selection, the actual work, and about 30 minutes to keep up the connection. The relation is therefore 1 or 2 to 1,800. If we total the uses of the different selectors for telephone service, we will find that these instruments are used only a fraction of a time for complicated work, and are used for the rest of the time for very simple work.

The fact has been brought to answer this argument, that every subscriber has one of these instruments always at his command, and that therefore the high initial cost is well balanced by the frequent use made of it. But this equipment must always be kept at maximum supply even when the service is at its lowest, *i. e.*, during the night. Take the manual service on the contrary, and we see that after rush hours, during the night, the force can be reduced so as to keep it in proportion with the low service. The force of this argument is best understood if we quote an example. The Rotterdam exchange employs 43 operators for about 450 operator-hours during the rush hours, while at night this number is reduced to two. In the automatic service the equivalent for the rush hour service, *i. e.*, 450 hours must be allowed for, both day and night. There is no opportunity of reducing the service according to needs, and when installing and planning an equipment, the necessary installation for rush hour service must be taken as a standard. To eliminate these drawbacks, if such they prove to be, the system would have to be reduced to say one selector per ten subscribers, and this selector would have to be placed automatically at the disposal of each of the subscribers at certain intervals of time and for a certain definite length of time. These selectors should be constructed in such a way that their work ceases as soon as the connections are made, so that each is ready for another subscriber, without, however, being troublesome to the first subscriber. The purpose of the right type of group selector would be to select an open wire for any subscriber of its group, make the connection, and then be open for the use of any other subscriber. The entire problem can be summed up in the requirement of entire independence mechanically of the selector machinery which selects and makes the connections, from the further machinery needed to keep up the connection, and later to break it. In this way less expensive and less complicated mechanisms could be used for the latter purpose, utilizing the more expensive mechanism for relatively more important work. How far this can be done remains to be seen. There seem to be no absolute obstacles that would prevent this change, and the efficiency and economical value would be increased.—*Zeit. f. Schwachstrom.*

DISINFECTION OF TELEPHONE INSTRUMENTS.

The Imperial German postoffice department has issued new regulations on disinfection of telephone instru-

ments, which are given as follows: At exchanges and public telephone stations the receivers and transmitters must be cleaned and disinfected regularly each month. The dust is to be removed and then the instrument wiped off with a sponge, rag or piece of fine sandpaper moistened with the disinfectant. At public telephone stations only those instruments need be cleaned that are used by different persons. But even the telephones used in private offices must be disinfected, although less frequently. Those instruments that are taken out of service and are returned to stock, must be thoroughly disinfected before being received in the stock room. Those persons who take care of this part of the work are to inspect the general cleanliness of the exchanges and telephone substations and report any irregularities. The department

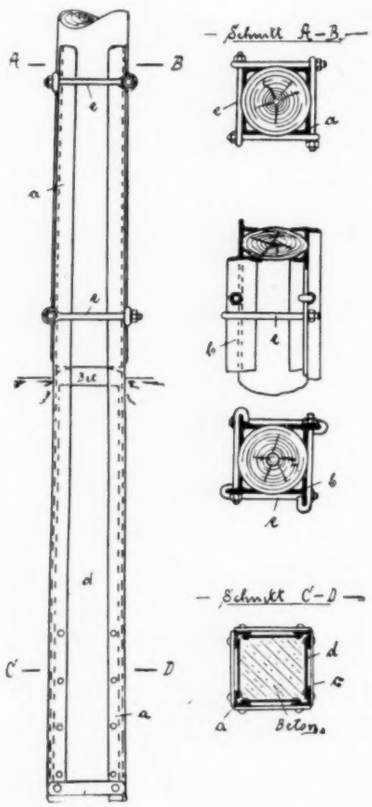


Fig. 2.

hopes to achieve better and cleaner service by having the employees follow these rules.—*Zeit. f. Schwachstrom.*

PROTECTION OF TELEPHONE LINES AGAINST STRAY ALTERNATING CURRENTS.

Girousse in the *Comptes Rendus* of the French Academy of Science speaks of a system which eliminates the effect of stray alternating currents upon telegraph and telephone wires. He has a receiver with two equal and two oppositely wound or differential coils, whose opposite influences balance and neutralize each other when an alternating current acts upon them. One of these windings is in series with a self induction and a capacity which can be brought in resonance with the number of periods of the stray alternating current. The other coil has a resistance whose magnitude corresponds to the resistance of the self induction coil. Through the action of this resonance the a. c. is equally distributed upon both coils, and does not influence the receiver at all. The d. c. of the telephone line passes only over the coil which has the resistance in series, and therefore acts upon the instruments in the usual manner.

For practical purposes it is necessary to find out what limits there are, within which current strength and frequency of the a. c. may vary, without eliminating the good effect of the protective system. The author used a Morse instrument and a battery of 60 volts. As stray current, an a. c. of 30 milliamperes strength and 42 periods was used. It was impossible to vary the frequency of the a. c. system, but the capacity could be changed. A ten per cent change of the capacity called forth the same effect as a five per cent change in the frequency. To extend this limit, the resistance of the d. c. line was increased, and a voltage of 150 volts was used. There is a different way to reach the same result. A capacity and self induction coil was placed between the line and earth, and this is in resonance with the troublesome a. c. The stray current finds in this extra circuit only the ohmic resistance of the self induction coil, and passes through the same, while the d. c. passes entirely through the telegraph or telephone instrument. Any number of these coils can be used to eliminate the effect of any number of stray currents. If a single telephone line is used, this shunt circuit is arranged to be less than one-quarter of the current circuit of the protected apparatus. Under these circumstances only one-fifth of the a. c. reaches the receiver, and the ultimate limits for changes of freqeuncy and for troublesome current strengths can be extended considerably. For example, take a telegraph line to be protected with the Morse apparatus at 7,500 ohms, the battery voltage at 150, the impedance of each a. c. circuit at 2,200 ohms and a frequency of 25. The resistance of the self induction of the shunt circuit is 500 ohms. Under these conditions we may take it for granted that the troublesome e. m. f. can be varied at any time from 0 to 110 volts and that the frequency varies between ± 10 per cent, without injuring the service, but rather eliminating the bad effect of stray currents.—*La Lumière Electrique.*

A PHYSICIANS' EXCHANGE AT VIENNA.

The Vienna telephone company has started the service of the so-called physicians' exchange. Any physician in the city, whose family is away from home, or who has nobody to take care of his telephone at all times, can be connected to this special exchange. If he is at a patient's house, or away on business, he notifies the exchange and the latter notifies him of any calls, and if necessary sends him an automobile at his expense to bring him to his destination. If a party calls up some physician who does not answer the telephone, he is connected to the exchange, who will connect him to the doctor's substitute, or, if that is not possible, connect him to another physician. The last telephone directory has a list of doctors who are members of this medical exchange, and who can be reached through it at any time.—*Zeit. f. Post u. Telegraphie.*

NOISES IN TELEPHONE LINES.

The *Teknisk Tidsskrift* brings a short article stating that the Swedish engineer Saxenberg has devised a new method to eliminate noises in telephone lines. The same consists of a variable resistance in the form of two water elements, which are connected with each other, and are grounded with one end, and connected to the lines with the other. At each end of the line such an

apparatus is installed near the telephone receivers, so that the speaker can change the effect by moving one or the other of the electrodes. The device conducts the induction currents or troublesome currents to the ground. It is also said that it gives quite effective protection against atmospheric electric discharges. Since both charge and inductance change with the weather it is necessary to regulate the elements frequently. The apparatus was tested out on one line which had been useless prior to the installation of the device and is now in use, giving excellent service.—*Elektrotech. Zeit.*

CONCRETE BASES FOR WOODEN POLES.

Wooden poles are subject to destruction, especially if planted in moist ground, and the following innovation, shown in the Fig. 2, is to protect the poles against attack by moisture and other chemical constituents in the ground. The base consists of iron rods, filled with concrete. Four upright angle or T-shaped irons *a* and *b* are held together by four diagonally flat iron bars *c* and by four pieces of sheet iron *d*. The sheet iron is only riveted to the lower part of the base, and has some play between the upper angle irons, so that they can be closely pressed against the wooden pole in the center; *e* is a band running the entire circumference, and bolting the pole still more firmly to the base. The angle irons or T-rails, and the arrangement of sheet iron, giving a large area of even surface for support in the ground, give the pole a strong base, and greater resistance against external forces. The space between the wooden pole and the base sections is filled with concrete.—*Elektrotech. Zeit.*

What One Woman Thinks

By Sarah Elizabeth Brown

IT seems to follow that a man who is even partially successful is hedged about with a lot of enemies, who choose to be such for no reason at all. I have never understood this. In many instances the so-called enemy has had countless favors from the individual he decries. Men who have enemies usually play their cards on the table—all of them. Their enemies are the kind who would slip a few under the table if given the chance. It is difficult, at times, to agree with the popular theory the world is getting better—that men are having higher regard for each other. I have good reason to believe that there are men in the telephone business who stalk about as holier-than-thou independents while drawing pay from the opposing organization. I pity them. Similar conditions may exist in other industries and there may be reason for it, but I feel that the reason must be far-fetched in all cases and that no good will come of it. The telephone business is too close to all the people to be made to suffer such contamination.

* * *

Do you believe in Thomas W. Lawson of Boston? I find this question staring me in the face when I pick up my favorite newspaper. I don't. Tom Lawson is the man who told us that Trinity was worth ever and ever so much. He ran it up from 2½ to 45. Obediah got some of it at 28. He got it outright, like Lawson urged, and he has it yet. Not much, of course, but enough for me to doubt Tom. Trinity is quoted at around four. When will my old man get out?

* * *

Lawson says that the thing ailing us is due to watered stock. I have my own opinions. We squirted some water into our own telephone company and it seemed to do it a lot of good. For the first three years we paid no dividends. It took all we could earn, borrow and beg to extend the plant. Obediah gave his notes. When we began to reach our limits we took stock of our investments. In the meantime, we didn't have to be told that our franchise was worth something and having built a system with the idea of living with it, we found considerable property. The plant was paying. We formed a corporation. Our capital account was measured by the money that had gone into the plant. It wasn't burdened with fancy salaries or expert's findings. Our earnings for dividends were out of proportion. We declared a stock dividend of one hundred per cent and paid eight per cent on the doubled capital. There was much rejoicing. I was in on the stock and did my share. That was a long time ago. We have gone right along, increasing the system, providing for depreciation and maintenance and paying dividends in cash and stock. There is water in our company, offset by franchise value if nothing else. I believe in water. I will be the last to concede that watered stock is the reason for increased cost of living.

* * *

Tom Lawson wants you and me to believe our porterhouse steak comes high because there is 3,000 millions of watered stock in this country. Tom isn't reading the right dope. He is sticking to his stock ticker instead of the stock statistics. In the past decade we have had an increase of 18 per cent in population and 1.8 per cent decrease in cattle. A porterhouse steak has license to be high. Then, too, I remember the great, free range and the cattle barons. They have passed on. Lawson doesn't get this on his ticker. I believe he raises fancy Jerseys and pinks, but they don't give up choice cuts. If Lawson will tell me how to satisfy my family's palate with chuck, flank and brisket, I will have more confidence in his remedy.

* * *

Then I remember Billy Ferguson, who used to run the local elevator, and how he got Uncle Bill Kerr interested in a cold storage plant. Uncle Bill died a few years ago, but Billy Ferguson lives in the only mansion in our county and is pointed out as our local millionaire. Deliver me from the cold-storage business. As a cause for increased cost of living it has every other thing gasping for breath. I read only a day or two ago that there were more than a hundred million fowls in cold storage in the vicinity of New York. What chance have my turkeys and hens with a market backed up like that?

* * *

This is a popular theme and Lawson doesn't touch upon it. From way off in Holland, Dr. A. Heringa has

sent me a request for the Hon. Reed Smoot pamphlet I mentioned a month ago. TELEPHONE ENGINEER must cover a lot of earth and do it quickly. The doctor has some theories that smack of real thought on the subject. He says our farmers do not produce enough. Mercy, I thought we all worked too hard, measured by the foreign standards. At any rate we work hard enough.

* * *

I wonder if the rest of you farmer-telephone folks know what it costs to produce a "medium to good" steer for market—say a 1,400 pound critter that will fetch nine cents a pound at the stock yards. You probably never went into that game very far. Well, Obediah and I have specialized in that business from the beginning to the end. If you really want some inside information get the October *World's Work* and read what Col. J. B. Power has to offer on the subject. I wouldn't impose this suggestion if I didn't know that Col. Power is right. And you can take it from this and the next line—porterhouse steaks are going up.

* * *

Howsomever, this isn't telephone dope by quite a few jumps. I'm nearly as slow in getting into my subject as Grandma Bemis is—no, was—for I see she has finally submitted her figures to the Chicago council committee. It was careless, though, in letting the Chicago Telephone Company's engineering staff review the work and have the newspapers find it out.

* * *

You can always expect sensations if you look toward Ohio. I find that the mayor of Cleveland is in favor of a municipal telephone system. He wants Main 1, and believes he can build a new plant for six and a half million dollars. That is 65,000 instruments at $100 per station. Allen C. Morse, formerly chief engineer for the Cuyahoga Telephone Company is encouraging the mayor. This engineer believes it would cost Cleveland $15,000,000 to take over the Cuyahoga and Cleveland Telephone Company plants. I wonder what Charley Otis will say about this. At any rate, it will be some little while yet before you can get Cleveland over its own lines.

* * *

Well, what do you know about that—the old U. S. I. has settled up with its creditors. Wiped out $2,048,172 in claims for $1,500,000. For a concern, bankrupt, and without assets of any kind, that sounds like a pretty square proposition. I have been over the matter several times, but this being finis, I will recite that George Eastman, Hiram Sibley, Henry Strong, Jas. Watson, Eugene Satterlee estate and Albert Fenn of Rochester; William Page, Jr., of New York—all men of big affairs, were lured into Tom Finucane's dream of a big telephone company to rival the Bell. Finucane was a regular skyrocket promoter man. Himself rich, he could get to the other fellows who had it in chunks. Rochester is slopping over with Kodak money. Everybody lives in a king's palace and has chicken on the clear nights at Ontario beach. So a $50,000,000 telephone company, promising to build a system in New York City, had a lot of allurements. You know a promoter throws in everything when he talks and Tom Finucane is one of the best talkers and throwers-in you ever saw. Fingy Conners of Buffalo got $2,000,000 worth of the stock for his influence—it was a regular humdinger. It was to build New York City on a franchise for a burglar-alarm system. Talk about a nerve! Well, bubbles do burst, as you may recall, now that you think of it, and Finucane's did all of that. Before you could say John Robinson there was a pile of liabilities and nothing more. Then the stock started down the skids and died at 3. There wasn't any hope of doing anything with it. It was good and dead at 3. Then, happy thought, a small investor started the trouble. He put in $2,000 of real money and he wanted the answer. He fought and fought and fought. When he made his first touchdown, others started suits and the subpoena servers kept the big fellows so thoroughly occupied that they had to throw up their hands and settle. My brothers, it pays to scrap for your rights.

* * *

I have often wondered why other little investors—even those who were part of big-going concerns, were so easily satisfied. There is evidently a hypnotizing influence in a 1½ per cent quarterly dividend check. Hundreds of great corporations lay themselves wide open to investigation from the little fellow. His lawyers might insist upon a thorough accounting and analysis at great inconvenience to the concern. We are a people of great faith once we make up our minds. Personally, when I make an investment I always kiss my money good bye. When I see it coming back I say, "Lib, you grandmother, you always were a lucky girl."

* * *

Theodore N. Vail has me all in a flutter. He is always upsetting my tranquility, but this time he has shaken down my back hair. The excitement lies in his Western Union Telegraph Company report to stockholders. He tells us that there are less than 5,750,000 rural habitations in this country and that there are Bell stations in 3,200,000 of these homes. Of course, that means that you will find a Bell telephone in every farm house in today's travel and one in every other house in tomorrow's journey. I never travel over land for more than three days at a stretch, but I have done that in several parts of this country and I never saw a Bell telephone outside of the city or the town. I wouldn't care to go on record that the Western Union president has made a mistake, but I fear he has leaned mighty hard on the sub-licensee reports. Of course a telephone that leads to the Bell system, no matter who made it or sold it, is a Bell telephone when it gets into Mr. Vail's talks to his stockholders. The thing that troubles me is the lot of country homes that doesn't seem to have telephones of any kind. I have heard that we have reached the saturation point. It seems that we haven't. I prefer to think that a lot of telephone manufacturers have got cold feet. I wonder if a great lot of publicity of the old-fashioned constructive sort might not bring about a mighty satisfactory change in conditions. We are bound to have telephones everywhere. There ought to be more than enough room for several live factors who would join hands in whooping it up.

* * *

I am about to cease my activities as a contributor to this great telephonic barometer. I got into the work by accident, but no such luck will let me out. I will have to quit. There will be no regrets I am sure. My reason for quitting is my incapability—I don't seem to be able to forget. I have been visiting a sister in Lincoln, Nebraska. Now Lincoln is just one of those beautiful, non-commercial, semi-industrial cities where politicians congregate biannually and rob the taxpayers. It is the home of Bill Bryan and Frank Woods. Bryan put the town on the political map and Woods put it on the telephone map. While I was in town, Woods was having

the busy time of his life showing why the telephone rates in his territory should be advanced. He advanced a line of argument which must have been entertainment for Caspar Yost. You know that us telephone folks have underscored those passages in our code, which says the more you have to serve the more it costs for service. Well, Frank Woods has been buying lots of exchanges in the South Platte country of late and the merging of two in a town to one in a town has been somewhat expensive. It naturally follows that the duplicated instruments went into the discard. That cut off a lot of revenue, no doubt, and it seems that for a reason as good as this, he should plead for more money for what was left. At any rate he has begged for a higher rate. He will get it, too, for the poorest reason he can muster. Telephone rates were established when the game was young. It is being rejuvenated and made better. It is called upon to perform over more area, which means the junking of iron and the substituting of copper wire. Nebraska blizzards demand strong leads and lots of anchors and guy clamps and strand. You can't substitute these things on the revenues of a dollar a month. The Lincoln T. & T. Co. is one of Lincoln's big institutions and Frank Woods is one of Lincoln's big men. He will get what he goes after and give full measure to the best of his ability. I hope eventually to see the story of Woods' achievements in the telephone field. The company is building new headquarters of the most substantial sort and seems to be prospering.

* * *

In a day or two you men will know all about the election results. Then I do hope you'll get down to real telephone work.

Magnetic Properties of Nickel Steel

By Drs. E. C. Glanert and S. Helpeet

FOR a considerable time a certain school of thought, following the views published by Osmond, has considered that the various magnetic phenomena exhibited by iron and its alloys are solely due to allotropic modifications of the metal, and that α-iron, which is supposed to be stable below 730° C, when in a pure state, is magnetic, while the β and γ varieties are non-magnetic. The latter are said to be only staple above 730°C. and 890°C. respectively when in a pure state, but may be preserved at lower temperatures either by rapid quenching or by the addition of foreign elements, when a material which is non-magnetic at normal temperatures results. A certain amount of difficulty was encountered, since it was alleged that martensitic and austenitic steels consisted of either β or γ-iron, and many of these steels are strongly magnetic. The explanation given for this fact was that the quenching or other means of preservation had been inadequate to retain the whole of the iron in the β (or γ) conditions, and that there was thus a certain quantity of iron which had changed into the α condition intermixed with the other varieties. This, however, does not appear to be very plausible, since in such a case, owing to the finely divided and distributed nature of the magnetic substance, the magnetizability of the whole could only be very low, whereas the exact opposite is the case.

This difficulty appeared to have been surmounted when Maurer was able to produce a practically non-magnetic steel, consisting of pure austenite, by the rapid quenching of an alloy containing about 2 per cent of carbon and 2 per cent of manganese. Against this evidence it may be stated that such an alloy must be regarded as a special case, as the conditions are so complicated that it is impossible to draw any conclusions from such a product and to assume that they are also correct for pure iron. The authors' present series of steels also provide much evidence against the so-called austenite being a non-magnetic material.

One of the authors has recently studied this question, with regard to pure iron, and proved conclusively from purely magnetic data that β-iron cannot exist. It was further possible to prove that even if γ-iron is non-magnetic when in equilibrium, there is no proof that it need be so when under-cooled, and there is no magnetic distinction between α and γ-iron.

Quenching the 5 per cent nickel steel from 600°C. causes, as might be expected, only a very small difference in properties as compared with the some steel when slowly cooled. In both cases the micro-structure shows the material to consist of ferrite and pearlite. When the steel is quenched from 900°C. a marked change occurs. The coercive force is more than double that of the previous ones, the maximum induction is considerably lower, and the curve has the appearance that is associated with a hard steel. The microstructure shows the whole mass to be of a medium coarse martensitic nature. Contrary to this, however, quenching from 1,240°C. produces a softer material with a coercive force considerably below that of the specimen quenched from 900°C., whilst the maximum induction closely approximates to that of the slowly cooled alloy. This quenching temperature is far above that of the critical points of carbon steels, and is most certainly within the γ-range of temperature, in spite of which the magnetic properties are almost identical with those of a steel which has had every possible opportunity of assuming the α condition. The micrographic examination reveals two constituents, one of which assumes a much darker color than the other. The lighter colored one appears to have a pitted surface, and in places there are patches of a very coarse martensitic nature.

The changes which occur during the thermal treatment of the alloy containing 25 per cent of nickel are of a much more complicated nature. It may be regarded as representative of the irreversible nickel steels, since at this point the temperature-hysteresis of the series reaches its maximum. As delivered from the works, this steel is non-magnetic, and quenching from 600°C. (in the γ-range according to Osmond) does not affect this property. If the quenching temperature is raised to 900°C. the material becomes slightly magnetic, whilst if it is still further increased to 1,240°C. the alloy becomes strongly so; in fact, it possesses a permeability approximately equal to one-

fifteenth that of pure iron. The authors regarded the non-magnetic condition as the stable one for this alloy, and were therefore greatly surprised on finding that the slowly cooled specimen was even more strongly magnetic than the one quenched from 900°C. It was thought that probably some cause for this would be revealed if the steels were cooled to such a point as where they re-assume strongly magnetic properties. This point is quoted differently by various investigators. Hopkinson places it at—52°C., but both Osmond and Dumas assume it to be slightly above zero. The authors' steels were cooled to zero several times, but no change in the magnetic properties could be detected. The further cooling was undertaken in three stages, and conclusively proved that there is no sharply defined temperature at which the steels become completely magnetic, as is shown in the theoretical diagrams published by Guertler and Benedicks, in addition to the previously mentioned investigators, who constructed their diagrams from the practical results of experiments, but that the change begins probably at some temperature a little above —50°C. and gradually proceeds as the temperature falls, being more or less complete at 180°C. A most remarkable fact is that when the latter temperature is reached the alloys are in the same relative positions as regards their induction curves as they were before any cooling took place, and that the slowly cooled alloy and the one quenched from 1,240°C. are more magnetic than the others by practically the same number of units as they were in the original state, despite the fact that, at intermediate stages, the properties have varied very considerably. The only explanation of this fact seems to be that by quenching from a high temperature or slowly cooling, a certain amount of a strongly magnetic material is produced which persists through all subsequent treatment. If this were mixed with a fairly large proportion of the non-magnetic substance (which occurs nearly pure in the alloy when quenched from 600°C. or 900°C.), it would account for the fact that, though *per se* the substance is strongly magnetic, the mixture only appears partly so. The unmagnetic substance, of course, becomes magnetic when cooled to low temperatures, and thus permits the permeability of the previously magnetic one to be more accurately estimated. If the originally magnetic substance were only magnetic to the degree shown by its induction curve, it is improbable that after cooling to —180°C. it would retain its original advance over the rest of the material; but if it originally possessed the permeability shown by the curve after the cooling, it would appear that this treatment had rendered the non-magnetic substance a better conductor, thus enabling the true value of the original material to be measured, whilst previously this was impossible owing to the finely divided state of the substance. The micrographic examination of these alloys does not afford any explanation of their magnetic properties.

To provide a theoretical explanation of these results is also a matter of great difficulty, being very much complicated by the behavior of the alloy when slowly cooled, but the authors hope to obtain more information on the subject by a further set of experiments, which will consist in re-heating the alloys to various temperatures for a considerable time, and by noting the magnetic changes to form a clearer idea of the exact conditions under which the alloy assumes the unmagnetic state. As a tentative explanation of the facts, it appears as if strongly magnetic substances were formed at high temperatures, which is not indicated in the equilibrium diagram, and that this disassociates at some point between 600°C. and 900°C., but tends to re-form the former temperature, under favorable conditions (very slow cooling). This opinion will probably have to be modified very considerably when more data is obtained, but in the light of present knowledge it seems to be the only possible explanation in accordance with the facts.

The 33 per cent nickel alloy is only very slightly affected by the drastic thermal treatment to which it was subjected, and it seems possible that there may be some connection between its remarkably low coefficient of expansion, and the very small change in its magnetic properties. The coercive force in every case is exceptionally small, and the material seems to be extremely soft (magnetically). There is a slight increase in the hardness as the temperature of quenching rises, the maximum induction showing a very small reduction, the coercive force an increase, and the general shape of the curve is that of a harder material, though as regards the latter property, the specimen quenched from 600°C. seems to be as hard as any of the series. The steels are unchanged by cooling below zero. The metallographic examination also shows only comparatively little change.

The following conclusions are drawn from these experiments: 1, A 5 per cent nickel steel is hardest (magnetically) when quenched in the neighborhood of 900°C. Quenching from higher temperatures results in a softer material. 2. The changes which occur during the thermal treatment of a 25 per cent nickel-iron alloy are of a far more complicated nature than has previously been thought. At high temperatures there probably exists a product which may be preserved by rapid quenching, and is then strongly magnetic, and persists to the temperature of liquid air. This product does not exist in the region between about 600°C. and 900°C., but for another which is also magnetic can possibly occur at about 300°C. There is very little connection between the magnetic properties and metallographic structure. There is no sharp magnetic change point for this alloy below zero, but the permeability gradually increases as the temperature decreases from about —50°C. to 180°C. 3. The magnetic properties of a 33 per cent nickel-iron alloy are only very slightly affected by thermal treatment. Despite the "γ-iron structure" produced on this steel by the more general etching media, it is strongly magnetic and soft. 4. There is no connection between magnetic properties and micro-structure. 5. There is no evidence that if γ-iron exists it is non-magnetic. 6. The microstructures of commercial nickel steels are practically the same as those of meteoric iron.

Oklahoma Commission News

The Oklahoma Corporation Commission has deferred final action on the complaint of F. E. Clayton of Chickasha against the Pioneer Telephone Company, alleging discrimination in rates, in view of the discovery that the discrimination complaned of grew out of the application of zone rates. The whole question involved in the use of the zone system is to be threshed out by the commission at a later date.

Wiring Large Buildings for Telephones

By Frederick L. Rhodes*

LOFT BUILDINGS.

CONDUITS for wires or cables are rarely provided in loft buildings. The riser cables are placed in shafts and the wires are distributed on each floor along the baseboards. The wire center on each floor is usually at the baseboard near the passenger elevator shaft. Although this arrangement is undesirable in many cases, it is difficult, on account of the floors being undivided and the locations of the telephones not being known until the premises are occupied, to make any provision in advance for distributing the wires. A system of conduits and floor boxes would be expensive and is not considered necessary.

Where one firm occupies the entire loft building, the size of the riser cable is determined entirely by the equipment of the private branch exchange switchboard and the probable future requirements of the firm as to telephone service. In a case of this kind the center of the wire system is at a cross-connecting box located close to the private branch exchange switchboard.

A modification of the method of distribution already described for office buildings is usually employed in loft buildings. The riser cable is divided into two parts termed "bridged feeder" and "house cable." The house cable pairs are terminated in the main terminal box near the foot of the riser, and the bridged feeder pairs are directly connected to pairs in the exchange cable and also by a branch splice are terminated in the main terminal box.

Example of Loft Building Wiring.—Fig. 9 shows

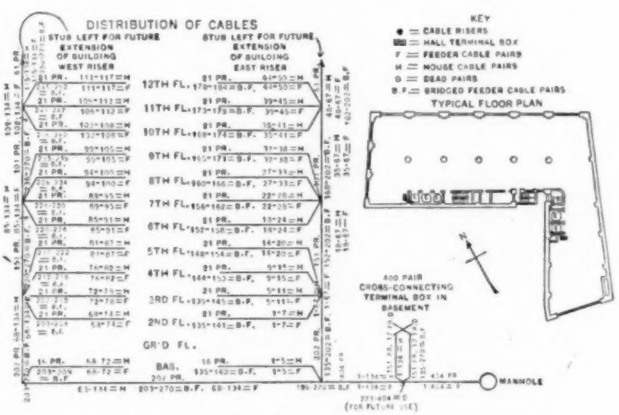


Fig. 9.—12-Story Loft Building.

the floor plan and cable distribution of a twelve story loft building. It will be noted that the arrangement of pairs does not agree with the preceding statement that in loft buildings the riser cable is divided only into bridged feeder and house cable groups. This diagram shows, in addition to these groups, certain direct feeder pairs. The reason is that it is expected that this particular loft building will sooner or later be partitioned off for office use, and this condition has been anticipated in planning the cable distribution.

HOTELS AND APARTMENT BUILDINGS.

General Scheme of Wiring.—The telephone systems for hotels and apartment buildings differ from those for office and loft buildings in one important respect. Hotels and apartment buildings can be wired in advance on a permanent basis on account of the probability that there will be no essential change in the number of wires needed, the ultimate requirements

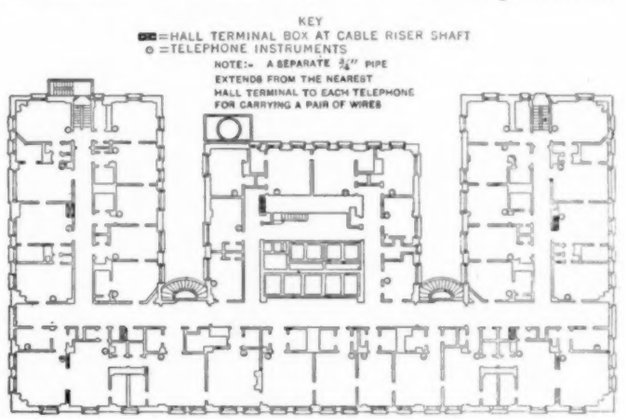

KEY
=HALL TERMINAL BOX AT CABLE RISER SHAFT
=TELEPHONE INSTRUMENTS
NOTE:- A SEPARATE ¾" PIPE EXTENDS FROM THE NEAREST HALL TERMINAL TO EACH TELEPHONE FOR CARRYING A PAIR OF WIRES

Fig. 10.—18-Story Hotel, Typical Floor Plan.

being closely determined by the number of rooms or apartments. The locations for the telephones in the various apartments or rooms are also generally permanent and the relative locations of the telephones are the same on each floor.

The telephone system installed in these buildings consists of a private branch exchange switchboard located at some convenient point, usually on the ground floor. In hotels this private branch exchange switchboard is placed in or near the office. Telephones are installed in each room or apartment and wired to this switchboard. The latter is connected by the necessary number of trunk lines with the nearest central office of the telephone company.

The wiring problem is simple in comparison with that in office buildings. It consists of running a pair of wires from the telephone location in each room or apartment to a common center in the cross-connecting box near the private branch exchange switchboard. It is important to make provision so that the telephone company can run its wires from the cross-connecting box of the private branch exchange switchboard to some point in the basement where connection can be made to the central office cable. The latter cable is generally not run in conduit but is clamped to the ceiling of the basement.

Subsidiary Conduit.—Conduits for distributing wires on floors in hotels or apartment buildings should not ordinarily be over 50 feet in length nor should they have more than three bends with a minimum radius

*A paper presented at the twenty-ninth annual convention of the A. I. E. E., Boston. Concluded from October.

of five inches. Any conduit 100 feet in length should not be less than one inch in diameter: Five-eighths-inch conduit should be provided for a maximum of two pairs of wires and ¾-inch conduit should be provided for a maximum of four pairs of wires. For more than four pairs of wires it is preferable to run cable.

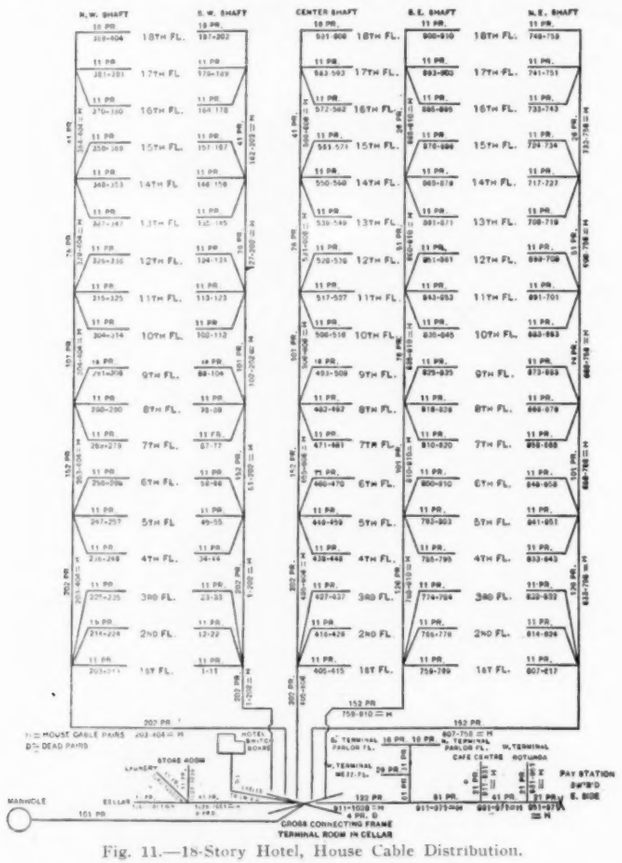


Fig. 11.—18-Story Hotel, House Cable Distribution.

Hotels.—In laying out the wiring system for hotels, in addition to one pair of wires for each room, as mentioned above, provision has ordinarily to be made for a small percentage of spares to provide for defective pairs and for a few direct lines.

From the wire center at the cross-connecting box near the private branch exchange switchboard a cable is extended through the basement or sub-basement to the foot of the riser shaft. The riser cable extends up this shaft as a diminishing cable with subsidiary terminals located at convenient points on each floor for reaching the various rooms. The wires are distributed on the floors either by molding or through conduits, as the case may be. In many of the modern hotel buildings complete conduit systems are provided for concealing the telephone wires and cables. In such cases the vertical conduits are installed at some central point and junction boxes are provided on each floor for splicing and terminating cables. From the junction boxes separate ⅝-inch conduits are extended to each room. The outlets in the rooms should be located 4 feet 10 inches above the finished floor for wall sets, this having been found by wide experience to be the most satisfactory height at which to place the telephone. For desk stands the outlets should be at the baseboard near the proposed location of the telephone. Where the floor area and the number of rooms are large it is often economical to have more than one terminal box on a floor.

EXAMPLES OF HOTEL WIRING.

18-Story Hotel.—Figure 10 shows the floor plan of this hotel with the locations of the riser cables and the individual telephones in each room. The separate conduit runs from the riser terminals to the rooms are not shown in order to avoid confusion on the drawing. Figure 11 shows elevations of the riser cables with the branches at each floor.

In this installation the riser cables (five in number) are placed in shafts and the wire distribution on each floor is in separate conduits to each room. It will be noted that no feeder pairs are provided in the riser cables.

17-Story Hotel.—This is a complete conduit in installation. Figure 12 shows the riser cable terminal boxes and individual telephone locations on a typical floor. Figure 13 gives the elevation of the house cable system. This hotel has an apartment section which is cared for by the North riser cable. This section of the house has its separate switchboard. The other two riser cables feed the hotel portion of the house.

ELEVATOR APARTMENTS.

Elevator apartment buildings are generally wired on the basis of two telephones to an apartment, one connecting to the private branch exchange switchboard and the other when desired, directly to the central office of the telephone company.

In most of the high class elevator apartment buildings it is the practice of owners and architects to provide conduits for concealing the telephone wires and cables. In some cases a vertical shaft is provided instead of vertical conduit.

Where the floor space occupied by each apartment is small and the horizontal runs on each floor are short a riser or diminishing house cable is placed. This cable is extended up through the building in a conduit or a shaft, as the case may be, and branches containing a sufficient number of wires to provide two

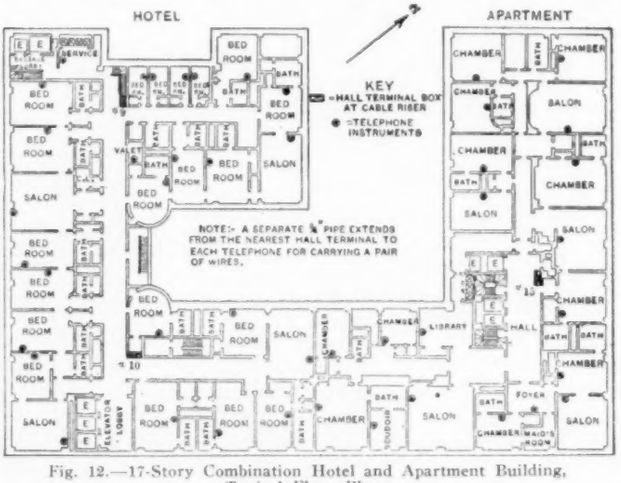


Fig. 12.—17-Story Combination Hotel and Apartment Building, Typical Floor Plan.

pairs for each apartment are terminated in junction boxes located at central points on each of the floors. From each junction box ⅝-inch or ¾-inch conduits are extended to the location of the telephone in each apartment, the outlets being located, as in hotels, at

the baseboards for desk telephones, and in the wall, 4 feet 10 inches above the finished floor, for wall telephones. This arrangement provides a flexible system, as the wires between the apartments and the subsidiary branches may be drawn in whenever service is required. As the horizontal run of conduit on each floor is comparatively short, the cost of the conduit installation is minimized. There is a further opportunity for economy in installing conduits from the junction box to the apartments, as it is frequently possible to use a single run of conduit for two apartments instead of a separate conduit to each.

In apartment buildings where the floor space occupied by each apartment is large, the above arrangement would necessitate long runs of small size conduit on each floor. In such cases, to avoid the excessive cost of this conduit, the wires are usually distributed to the apartments by a vertical system of conduits extending from the basement up through each tier of apartments. These vertical conduits diminish in size as they approach the upper portion of the building and the outlets in the apartments are located in the walls at the points where the telephones are to be placed.

In the basement, cables are extended from the cross-connecting box near the private branch exchange switchboard along walls and ceilings to the foot of each line of vertical conduits. At these points terminals are established with sufficient conductors to provide two pairs of wires for each apartment to be cared for by the riser. The pairs of wires between

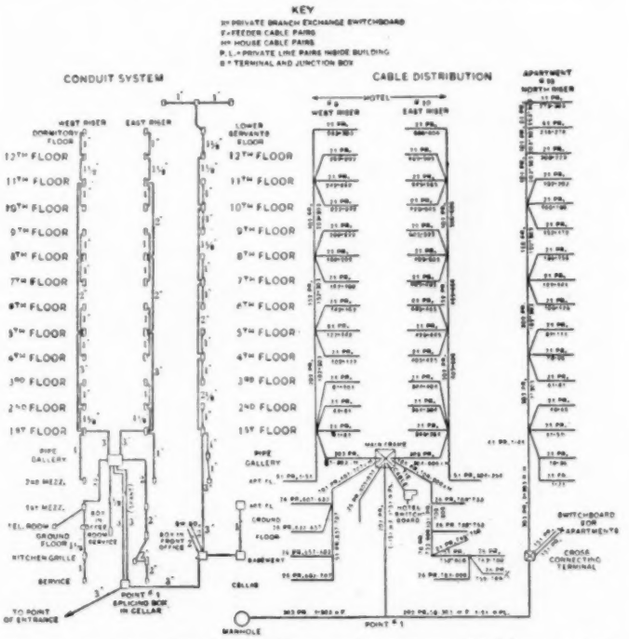
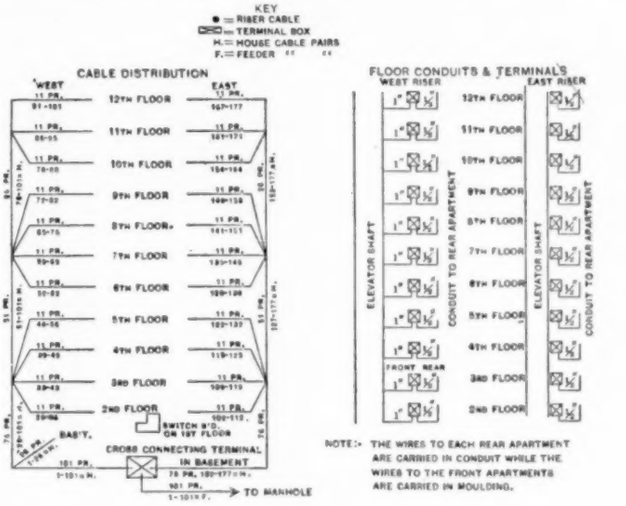


Fig. 13.—17-Story Combination Hotel and Apartment Building, Conduit System and Cable Distribution.

these terminals and the apartments are pulled into the conduits as the service is required.

The size of the vertical conduit varies with the number of apartments to be served. Generally a conduit two inches in diameter in the basement diminishing gradually to ¾ of an inch at the upper floor is sufficient to care for buildings 10 to 12 stories in height, and a conduit 1¼ inches in diameter in the basement diminishing to ¾ of an inch at the top for buildings from six to ten stories high.

The number of vertical lines of conduit depends on the number of apartments on each floor. Usually a separate line of conduits is required for each tier of apartments, but it is often possible to care for two adjacent apartments on each floor by a single line of conduit when the telephones in both apartments are



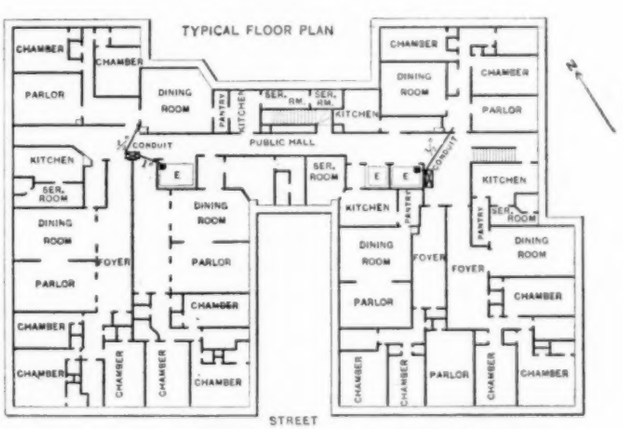


Fig. 14.—12-Story Elevator Apartment House.

to be placed on the dividing wall between them. This arrangement is, however, open to the objection that installers must gain access to one apartment for the purpose of installing the telephone in another. In spite of this objection, from the standpoint of the owner this method is probably the best for buildings of this class as it minimizes the cost of installation of conduits and is flexible enough to admit of direct lines being installed when such service is required.

Example of Elevator Apartment Building Wiring.—Figure 14 shows a 12-story elevator apartment building with six apartments to a floor and stores on the front of the first floor. The two riser cables are run in the elevator shafts.

A diagram is given showing the junction boxes on each floor and the sizes of the conduits used for distributing the wires on each floor.

NON-ELEVATOR APARTMENTS.

Apartment buildings of the non-elevator class do

not as a rule exceed five or six stories in height and frequently have as many as ten apartments on each floor. Buildings of this class are wired by extending lead covered cables from the cross-connecting box near the private branch exchange switchboard through the basement to the foot of each dumb-waiter shaft where terminals are established. The terminals are made large enough to provide approximately for a direct line and an extension telephone for each apartment cared for by the dumb-waiter shaft, when it is thought

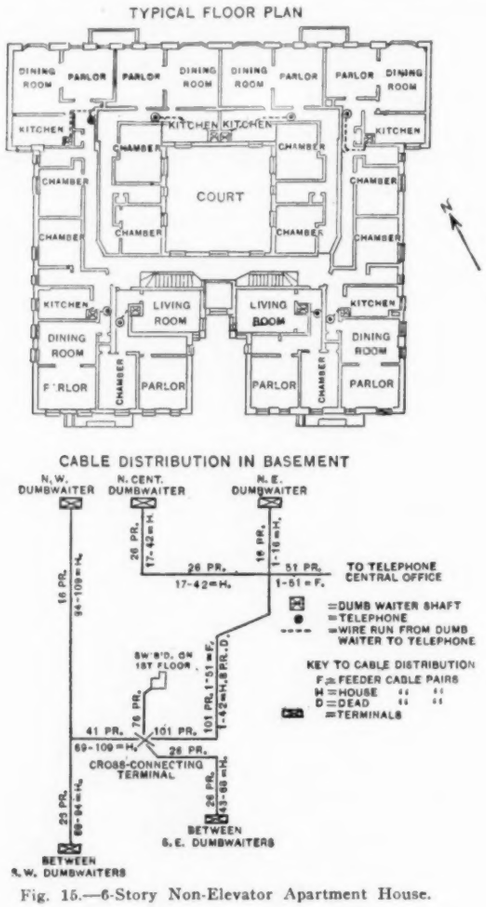


Fig. 15.—6-Story Non-Elevator Apartment House.

that direct service will be required. The allowance made for direct line service depends upon the neighborhood. The wires to the various apartments are extended up through the dumb-waiter shafts from the terminals in the basement as service is required.

In some cases these buildings are wired in advance by forming the wires into a cable and taping the cable to protect it against mechanical injury, one or two pairs being brought out at each apartment.

Example of Non-Elevator Apartment Building Wiring.—Figure 15 illustrates the case of a six-story apartment building having eight apartments to a floor. The wiring diagram shows the cable distribution in the basement to terminals at the foot of the dumb-waiter shafts.

The author wishes to acknowledge the valuable assistance of E. S. Worden and W. A. Taylor in preparing the illustrative examples of this paper.

California Commission News

The California Railroad Commission assumed its larger powers on March 23 of this year. Within two months a preliminary study of the general situation in the state convinced it that one of the most flagrant examples of excessive rates was to be found in the toll exacted by the telephone company for the service between San Francisco and the cities of Oakland, Alameda and Berkeley, on the Alameda shore.

The commission proceeded to readjust the rate. The telephone company had for a long time charged 15 cents as the minimum for a conversation of three minutes. The business between Oakland, Alameda and Berkeley on the one shore, and San Francisco on the other, had assumed very vast proportions. The population thus served, amounting to 750,000 people, in the very nature of the close relationship between the cities, found more than ordinary use for the telephone. The average per capita use, therefore, was considerably above the normal.

The commission took all these matters into consideration and ordered its experts to make an investigation. They soon reported that the rate at 15 cents was unreasonable and excessive, and that a 10 cent rate would be more nearly equitable.

During 1912, up to September 1, the average number of telephone calls per day, as between San Francisco on the one hand and Oakland, Alameda and Berkeley on the other, has been 9,096. Since September 1, when the rate was cut from 15 cents to 10 cents, the average number of calls per day has been 9,840. It thus appears that there is a saving to the public of 5 cents on every one of the 9,840 switches per day. This amounts to $492 per day. Carried over a year, the total saving to the people will be $179,580. It is the belief of the commission that the saving will reach to greater figures as time proceeds.

New Jersey Commission News

The New Jersey Commission has filed a memorandum withholding its approval of an ordinance of the Borough of Dunellen, granting a franchise to the New York Telephone Company. It is stated that approval will be granted if the ordinance is amended in the following particulars: The provision reserving the power of this board should be broadened so as to apply to any commission that may succeed to its powers and duties and so as to include both overhead and underground systems. The ordinance should be made applicable in its terms to all existing and future local rights of the company. Provision should be made for the giving of notice by the company to Dunellen before the beginning of any work. If it is desired to retain the section as to the readjustment of the terms of the grant it should be reframed so as to make it clear that it is not the intent in readjustment to confine the municipality to the amount of free service now provided for.

South Dakota Commission News

The South Dakota Railroad Commission has ordered a hearing to be held at Sioux Falls on November 7, with representatives of the telephone companies of the state to consider the establishment of a uniform time limit for toll messages. A good many complaints have been received regarding the time limit of two minutes, and the question of a two or three minute limit will be taken up.

The Law and the Telephone

By E. J. Wenner

TELEPHONE SERVICE ON SUNDAY—CONSTITUTIONAL PROVISIONS REQUIRING—REASONABLE HOURS—PECUNIARY LOSS—CHARTER DUTY.

NOVEL questions are constantly being raised in telephone litigation as well as in litigation concerning other businesses. Recently a citizen of the state of Oklahoma endeavored to require a telephone company to furnish service every minute of the day and week, even though it was shown upon hearing that it was unprofitable to furnish service in a town of three hundred people during all of Sunday, and that reasonable hours were allowed for patrons for the use of the system on Sunday. So far as the writer can ascertain no other case involving a similar case has reached a supreme court of any of the states.

The constitution of the state of Oklahoma provides for the creation of a body to be known as the Corporation Commission, whose duty it is to settle disputes between public service companies and their patrons.

On February 14, 1910, W. N. Mitchell filed a complaint with the corporation commission alleging that the Twin Valley Telephone Company was engaged in transmitting messages by wire between points in said state and operated an exchange in the town of Morrison, a town of three hundred inhabitants, charging stipulated prices for the rental of its telephones, etc. Complainant alleged further that the company refused to keep its office open on the first day of the week known as Sunday, and would not receive or send messages on said day, much to the inconvenience of the subscribers.

It appears that complainant had been a subscriber for several years, and that in the first of the year 1910, the company adopted a rule whereby the exchange would not be open from 8 A. M. to 2 P. M. or from 4 P. M. during the balance of the day on Sundays. Complainant refused to pay his telephone rental after the new rule went into effect and asked for a discontinuance of his service. The telephone was removed and his service discontinued. After the removal of the telephone he commenced corresponding with the corporation commission, and, after some assurances that he could require service on Sunday, he arranged for the reinstallation of his telephone. Shortly thereafter the complaint was filed.

The constitution of the state of Oklahoma obligates all telephone companies to receive and transmit each other's messages without delay or discrimination, and make physical connection with each other's lines under such rules and regulations as shall be prescribed by law, or by any commission created by the constitution or any act of the legislature for that purpose. Upon the hearing a member of the commission referred to the constitutional provision above mentioned, and said that telephone companies were required to give service to the people when demanded, and that the commission could make no other order than to require service when a patron complained that he was not receiving it. After a hearing the commission made the following order:

The complainant is a farmer living about four miles northwest of Morrison and is a subscriber to the telephone company and pays a stipulated rental per annum for services. The defendant, the Twin Valley Telephone Company, is duly organized under and pursuant to the laws of the state of Oklahoma, with its main office in the town of Morrison, and is doing a general telephone business. Complainant alleges that he and other subscribers do not receive the service they are entitled to on the first day of the week, commonly called Sunday, in that the defendant closes its office during the hours of 8 a. m. and 2 p. m. and from 4 p. m. for the remainder of the day. Defendant admits of this being true. It is the opinion of the commission that when a telephone company makes a charge for service or when such company is serving the public, whether for pay or free of charge, it should so equip its office or offices as to render services to its patrons at any or all times. It is, therefore, ordered that on or before August 1, 1910, the defendant, Twin Valley Telephone Company, shall so equip its offices as to render efficient telephone service both day and night at any fractional part of the minutes on each day of the week, and shall continue to maintain such service until further ordered by the commission. Defendant excepts.

The company appealed to the supreme court where the order of the commission was reversed. The court said the question for determination was whether, under the record, and with a showing that the furnishing of service was at a pecuniary loss, the company should be obliged to furnish it at all hours. Such a requirement is unreasonable.

The court sets out at some length in its opinion the statutes of the state of Oklahoma prohibiting Sunday labor, and all statutes making criminal amusements, labor and various employments on Sunday. The sections are set out in order that it may be seen what acts or labor on the part of subscribers of a telephone exchange would be legal when performed on Sunday. Such is essential in order to determine what Sunday service by the telephone company would be reasonably necessary. The requiring of operation of said exchange between the hours of 9 A. M. and 2 P. M. on Sundays in a town of three hundred people, when works of charity and necessity would not reasonably require the use of a telephone during such period, would be not only unreasonable, but also against public policy. If the order had merely required the exchange to be kept open after a reasonable hour on Sunday morning until 9 o'clock, and thereafter from 2 o'clock in the afternoon until 4 o'clock, in view of the statutes in force relating to observance of Sunday, the commission's order would not have been disturbed. It is essential that the company operate its exchange during reasonable hours of every week day in order to comply with its charter and franchise obligation, but when it is sought by virtue of the constitutional provision mentioned above, to require such telephone exchange to be kept open and operated during the night time at a pecuniary loss, when the patronage of such company will not reasonably support the operation of the exchange during the night, such order is unreasonable and unjust. If the law required that each telephone exchange in the state, whether in a village, town or city, be operated at every minute during the day or night on Sunday and every other day of the week, regardless of the reasonable necessities therefor or of the expense of such service, it would result in driving these exchanges from small towns and villages and only cities would have such facilities and conveniences. The law makes no such requirement.

Charter and franchise obligations require that the exchange be operated during reasonable hours. A regulation which goes further than this and requires additional service at a pecuniary loss to the company is invalid.

The supreme court further holds that rural or farmers' lines operated on the mutual plan, without any charges or toll for the use of the line, are not subject to regulation by the corporation commission. The propositions of law laid down by this case, which can be considered as ruling on the points in question are:

The law can require the operation of a telephone exchange on Sunday only for such reasonable time as works of necessity or charity and lawful acts may reasonably require the use of same.

A telephone company is required to operate its exchange during reasonable hours on each day of the week including Sunday; the Sunday hours, however, may cover some week day hours. What hours are reasonable depends upon the size of the town, city or village and the number of patrons, also the amount of income and expense, and the demand for service.

Twin Valley Telephone Company vs. W. N. Mitchell, *27, Oklahoma,* 388; 38 *L. R. A., N. S.* 235.

TELEPHONE RATES—AUTHORITY OF CORPORATION COMMISSION—VALUATION OF PLANT—MAINTENANCE FUND —REASONABLENESS OF RATES.

The Pioneer Telephone and Telegraph Company operates a general telephone business in the state of Oklahoma. It maintains various exchanges and operates toll lines between different cities and towns in the state. It owns and operates an exchange in the city of Enid, giving both local and long distance service from its Enid office. Prior to December 1, 1907, the company charged the following rates per month for service: $2.00 for business wall telephones; $2.50 for business desk telephones; $1.50 for residence individual telephones; $1.25 for residence two-party line telephones and $1.00 for residence four-party line telephones. On December 1, 1907, the following rates per month were adopted: $3.00 for business telephones; $2.00 for residence telephones and $1.50 for party line telephones.

On February 4, 1908, E. H. Westenhaver et al., filed with the corporation commission, a petition alleging that the telephone company had arbitrarily and unreasonably raised its rates and prayed for an order of the corporation commission prohibiting the company from charging and collecting under the new schedule, and requiring it to restore the rates charged prior to December 1, 1911. Several hearings were had before the commission, and a vast amount of testimony introduced. On May 12, 1908, the commission made an order requiring that the rates be reduced and that a schedule practically the same as that used prior to December 1, 1907, be adopted. From that order the telephone company appealed to the supreme court. Through a technical omission in certifying a finding of facts by the commission the matter was remanded, and the commission was required to report specially on the following questions: First, the value of the property used by appellant in its exchange at Enid. Second, the expense of operating such exchange. Third, the amount of expenditure to keep it in repair. Fourth, the depreciation of its property, if any. Fifth, the income or the probable income which appellant will receive on the rates fixed by the commission. This resulted in a rehearing before the commission which took place on June 7, 1909, and much additional testimony was introduced on behalf of both parties. On March 8, 1910, the commission made its findings of facts and certified same, together with the other evidence taken at the rehearing, to the supreme court.

Under the constitution of Oklahoma the supreme court is given the power and the duty to investigate the order and ascertain whether it is reasonable and just to the parties it affects. If it is found that the order is unreasonable and unjust, the supreme court shall substitute therefor such order as in its opinion should have been made by the commission at the time of entering the order appealed from. The courts have quite generally established a rule for prescribing rates. It is generally held that a rate is unreasonable unless a profit can be made by its charge, and that the enforcement of such a rate would be equivalent to the taking of private property for public use without compensation. It is most universally agreed that a rate is fair when its application will yield a fair return upon the reasonable value of the property at the time it is being used for the public. It is unfair when it does not yield such return.

The courts differ in the manner of determining the values of properties used in the public service. Sometimes the present value is derived by ascertaining the original cost of construction and all betterments, and deducting therefrom their depreciation. This is not always found correct as oftentimes there is extravagance and an unnecessary waste in construction. Quite frequently factitious issuances of stocks or bonds are made at the inception of the organization, and such should not be taken into consideration in fixing the rates. The public should pay. Oftentimes the market price or cost price of parts of entire plant, such as real estate, has so increased as to render the present valuation much greater than at the time of the formation of the company. Probably the method most fair to all concerned is to ascertain what it will cost to reproduce the plant, or the cost of its replacement at the present time, and deduct therefrom all depreciation in the existing plant. A rule contended for by many is that the true valuation of the property is what it would sell for upon a fair transfer from a willing vendor to a willing purchaser.

The appellant's Enid plant was purchased from former owners and much money immediately expended upon it. The total cost of the plant to the appellant at the time of the first hearing, exclusive of lands and buildings, was $135,689.01.

A Mr. Player was employed by the commission as an expert to value the plant, and his report and appraisement fixes the then present value at $94,663.69. Throughout the hearing Mr. Player's appraisement was regarded as practically correct, though an effort on the part of the appellant was made to add to it several items of expenses aggregating $20,790.34. Some of these items were included in Mr. Player's appraisement, though an item of $4,000.00, which is claimed to represent the interest on the investment during the period of construction, was not considered by him. The supreme court held that such was proper and should have been considered in fixing the rates, for this was a proper and necessary expense.

The supreme court found that the rates charged by the telephone company prior to December 1, 1907, would yield only a sufficient revenue to pay operating expenses and fixed charges, allow a reasonable amount for depreciation and pay a dividend at a rate of approximately

5½ per cent per annum (less than the legal rate of interest), on the value of the properties used in rendering the service, and that they were not excessive, oppressive or unreasonable to the public.

The order of the court therefor was that the finding of the corporation commission be set aside, and that the schedule of rates charged by appellant at the time of the institution of the proceeding, shall be the rates hereafter charged by it until further order is made in pursuance with law. If subsequent experience in the operation of appellant's exchange at Enid develops that the rates here promulgated operate oppressively upon the public, or that they fail to render to appellant, because of changing conditions in the city or of cost of operation, a reasonable return upon its property, either party has a remedy for relief by application to the corporation commission.

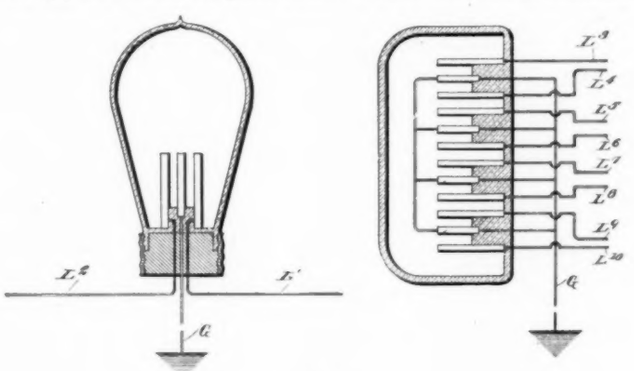
Pioneer Telephone Company vs. Westenhaver, et. al. 29, *Oklahoma*, 429, 38 *L. R. A., N. S.* 1209.

Recent Telephone Patents

By David S. Hulfish

1,034,584. Lightning Arrester. Frank Spencer Chapman, Kenton, Ohio, assignor to the National Electric Specialty Company, Toledo, Ohio. Filed Nov. 16, 1906.

The lightning arrester for single lines shown in this patent has the shape of an incandescent electric lamp, with its typical exhausted glass bulb. Within the bulb it contains



1,034,584.

three carbon blocks, the middle one of which is grounded and the other two of which are connected to the two line wires. The arrester has the advantages of conducting a lightning discharge without serious sparking and without burning the carbon blocks, since they are enclosed in vacuum and have no air to furnish oxygen for combustion. Separators between the blocks are not used, the blocks being spaced apart at a very much greater distance than is customary in air-gap arresters, since the striking power of the lightning discharge through the vacuum extends to a very much greater distance than through air.

Many lines may be accommodated in a single vacuum enclosure by the arrangement shown in the figure to the right.

1,034,609. Method of Fault Location on Electrical Conductors. Herbert M. Friendly, Portland, Oregon. Filed May 13, 1907.

The general assembly of this device is similar to a Wheatstone bridge, with a variable resistance in addition to the usual bridge units. The commutator or plug switch enables the inventor to change his circuits to produce his special tests. The object to be obtained is to perform the usual Varley loop tests. As usually performed, the Varley loop test requires two operations of the Wheatstone bridge, each of which attains a numerical result, which two results then are combined by a mathematical formula to secure the ultimate solution or location of the fault upon a telephone line. Mr. Friendly has so arranged his circuits and adjustable resistances that a second Wheatstone adjustment may be made without disturbing the adjustment first made, and the result of the two then is read directly upon the dial of the testing instruments.

In the illustration accompanying this review, Fig. 1 shows the arrangement of the plug switch or commutator; Fig. 2 shows the circuits of the device when making the first adjustment for measuring the loop resistance of the faulty line, a conducting plug being inserted at 19 and the resistance r being adjusted to a balance; Fig. 3 shows the circuits of the device when making the second and final adjustment, the conducting plug being inserted at 23 the resistance r being left as previously adjusted and the additional resistance r' being adjusted to a balance.

The patent as issued covers the basic principle or process by which the result is obtained, independently of the apparatus or the arrangement of testing instruments used to attain the result. Of the ten claims which the patent contains, the following are typical:

1. A process for the physical solution of electrical problems comprising, first, a measurement as a preliminary step involved in the solution of the problem, that measurement being made by the physical setting up of a condition in a measuring instrument, and, second, the attainment of the solution of the problem by a subsequent step involving the measurement

Fig. 1.

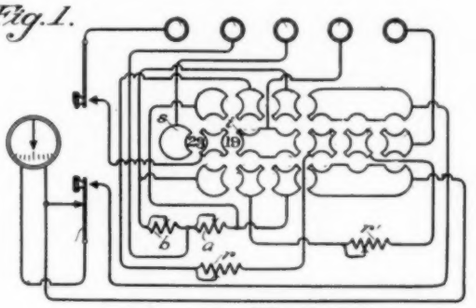


Fig. 2.

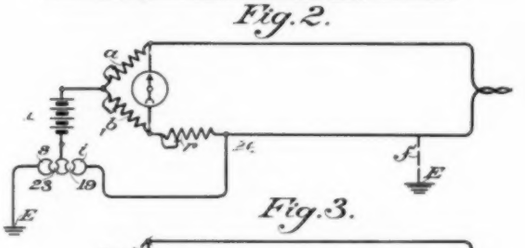
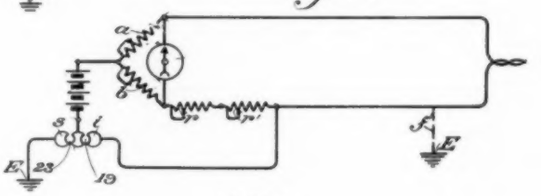


Fig. 3.



1,034,609.

made in the preliminary step, wherein said measurement is introduced by the inclusion of the condition physically set up by the preliminary step.

4. A process for the physical solution of electrical problems consisting of the attainment of a physical condition involved in the solution of the problem and then the attainment of the solution of the problem by a second and separate step, the physical condition attained in the first step being involved in the second step without change, the condition attained by

the first step being taken as the zero condition in the second step of the solution and a second measurement being made from that condition or adjustment as a starting point.

1,034,807. Telephone Call Recorder. Frank A. Lathrop, Portland, Oregon. Filed June 22, 1906.

A substation call sender for an automatic telephone exchange. The entire number to be transmitted is set up at once on the call sender, similarly to the Lorimer automatic system, and the call then is not only sent by means of electric currents in impulses over the line wires, but the number also is printed upon a paper tape.

1,034,875. Telephone System. Henry P. Clausen, Chicago, Ill., assignor to Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y. Filed Feb. 21, 1902.

The early date of filing is of interest. The plug when inserted into the switchboard jack places the supervisory relay as a shunt upon the coil of the line relay.

1,034,964. Magneto Bell Ringer. Elhanan Bowman, Elmwood, Ontario, Canada, assignor to Christian Rock Miller, Berlin, Canada. Filed April 18, 1912.

The electromagnets have the armature yoke mounted upon their ends by means of lock nuts, and the armature is attached to the yoke by a thin flat spring member, rigidly secured both to the yoke and to the armature, and having a return bend near its armature end.

1,035,157. Telephone System. Henry P. Clausen, Chicago, Ill., assignor to Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y. Filed March 23, 1901.

This application was pending in the United States patent office for eleven and one-half years. The first claim described the system:

1. A common battery telephone system, comprising subscribers' lines free from operating grounds outside the central office, a spring jack for each line provided with two contacts permanently connected with the opposite sides of said line, an operator's cord circuit provided with plugs adapted for insertion in said jacks, each talking strand of the cord circuit being divided into two sections, condensers connected with the four inner ends of the cord strand sections, means for supplying current, four relay coils through which the current is supplied to the four sections of the talking strands and whereby current is supplied to the lines through the talking strands when the plugs are in the jacks.

1,035,158. Telephone Apparatus. Henry P. Clausen, Chicago, Ill., assignor to Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y. Filed March 11, 1903.

The object is to provide a substation telephone circuit which will carry signaling currents for the supervisory circuits from a common battery switchboard without affecting the polarization of the receiver. In short, it is the problem (which has been contended with by every manufacturer who has introduced a common battery system to the telephone public) to produce a telephone which will take the speech currents through the receiver and which will take the signaling currents from the common battery switchboard through a path which does not include the receiver. In this patent a condenser is inserted in series with the receiver and one winding of an induction coil, and the remaining winding of the induction coil then is placed as a shunt upon the receiver and condenser and first coil winding. The early date of the application makes the patent of interest.

1,035,159. Telephone System. Henry P. Clausen, Chicago, Ill., assignor to Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y. Filed July 24, 1903.

One of the important features of this patent is the use of a line lamp and a line relay in which the line relay is locking. The claims have great scope upon this feature and the following are given as typical:

2. A telephone system comprising a subscribers' line, a line relay and means for energizing it, said relay being provided with normally closed contacts through which the coil of said relay is adapted to be initially energized and a local energizing circuit for said relay adapted to be closed by the energizing of the same.

3. A telephone system comprising a subscribers' line, suitable substation apparatus, and suitable switchboard apparatus, the latter apparatus including a line relay adapted when energized to open the line circuit by which it is energized.

1,035,172. Telephone System. Alfred H. Dyson, Chicago, Ill., assignor to Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y. Filed April 14, 1902.

A trunking system between two telephone exchanges, one of which is shown operating with local battery transmission and the other with common battery transmission.

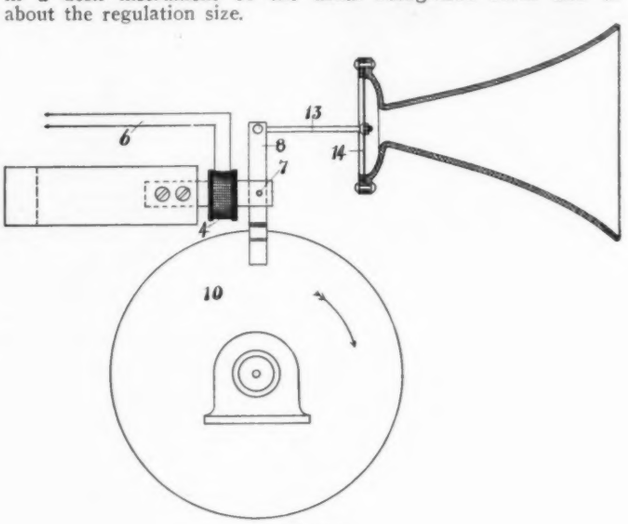
1,035,173. Telephone Apparatus. Alfred H. Dyson, Chicago, Ill., assignor to Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y. Filed July 24, 1903.

A trunking telephone system between two common battery telephone exchanges.

1,035,204. System for Measuring the Capacity of Electrical Conductors. Oscar M. Leich and Charles Hague, Rochester, N. Y., assignors to Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y. Filed July 16, 1907.

1,035,354 and 1,035,355. Signal Transmitter. William Kaisling, Chicago, Ill., assignor to Kellogg Switchboard and Supply Company, Chicago, Ill. Filed May 3, 1907.

These two patents cover a call device for automatic telephone system in which the movable member is pulled for each of the figures to be transmitted. The movable member or dial has ten finger holes for moving the dial and the distance through which the dial may be moved is determined by the particular finger hole engaged by the finger. The operating mechanism of the call sender is contained within the base of a portable desk telephone, and the movable dial is placed flat above the base. The entire desk telephone for automatic use thus is contained in a desk instrument of the usual recognized form and of about the regulation size.



1,035,577.

1,035,493. Telephone Line Selective Switch Device. John Henry Swanson, Minneapolis, Minn., assignor to T. F. Robinson, and to Robinson-Loomis Motor Truck Company of same place. Filed March 8, 1910.

The substation line is normally disconnected from the line to the exchange, but is connected at will by relay action.

1,035,577. Telephone Receiver. Sergius P. Grace, Pittsburg, Pa. Filed October 17, 1910.

A loud-speaking telephone receiver is produced by revolving rapidly a magnetic disk *10* within the poles of a horseshoe-shaped magnetic bar *8* pivoted at *7*, and connected by the link *13* to the receiver diaphragm *14*. The coil *4* is magnetized to varying degrees by speech currents incoming from the telephone line wires *6*. Because of the magnetic field of the coil *4*, a pull is exerted between the disk *10* and the pivoted bar *8*, this pull being transmitted to the diaphragm *14*. As the magnetism of the coil *4* varies, the pull upon the diaphragm *14* varies in magnified degree.

1,035,682. Telephone Attachment. Stanley M. Brehm, Miamisburg, Ohio. Filed May 17, 1911.

A writing pad support for desk telephone.

Telephone Wire Is Latest Wine Test

From Paris comes an excellent but rather novel method of testing wine. The discovery, which has just been reported to the Academy of Sciences, is made by M. Moquenne, who asserts that the telephone is the best way of telling whether or not wine is free from acid.

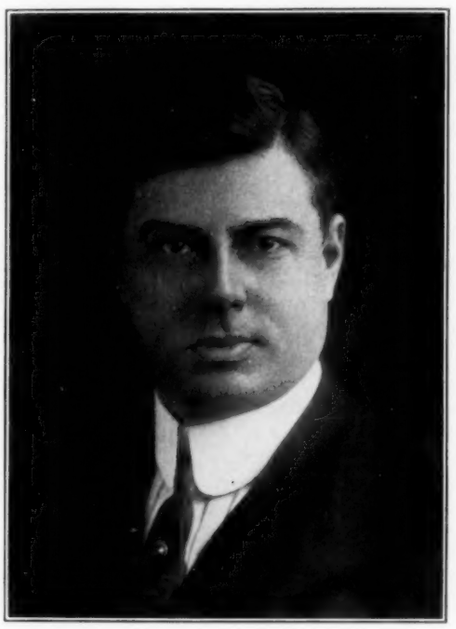
Pass the telephone wire through a vat or cask of wine, he declares, and if the wine is pure the words of the speaker on the other end will be heard distinctly, while should the wine contain an acid the words will be indistinct.

DEPARTMENT of RAILWAY TELEPHONES

How a Newspaper Man Became Wire Boss

G. O. Perkins, Chicago Great Western Ry.

BELOIT, WIS., is so named because the Illinois state line is just below it. At least that is the most plausible spontaneous explanation, and those who do not know any more about it will not question the statement. The city is also rocked in the cradle, as it were, of the Rock river—a stream of more or less nobility, and of pastoral or majestic beauty, according to where one strikes it. Beloit has the distinction of being one of the few small cities in Wisconsin not listed as a summer resort. For that reason it is an excellent place to go for rest and recreation.



George Otis Perkins, Supt. of Telegraph.

George Otis Perkins has never claimed that he left Beloit because he did not like it, or was tired of it. It just simply happened that having been born there September 29, 1866, and spent his childhood days in the usual ways, he began to grow up and look around; and so discovered a better opportunity at Quincy, Ill.

Quincy, from an esthetic standpoint, may not have anything on Beloit. It is a Mississippi river town, about sixteen miles north of Mark Twain's old home; and Mark somehow managed to convey the impression that those river towns are not altogether as effete as some of the New England villages, for example. But Quincy is a big, live town, and it gave George Otis a chance to learn something useful to wit, telegraphy.

Having learned it, George did not, however, linger by the Father of Waters. To quote him, his early career was spent in "various places"; each of which was on either the Wabash or the Santa Fe railroad and offered an opening to an ambitious young telegraph operator. Then commercial work began to look attractive; and the attraction focused at Chicago, with the Postal and Western Union companies as centers.

Here there occurred a curious departure on the part of young Perkins. He took up newspaper work in Chicago. Just why he did so, and why, having done so, he ever gave it up, does not appear. Anyway, he held editorial positions on Chicago dailies for several years. Then in 1900 he jumped suddenly back into railroad work. He became superintendent of telegraph, too, mind you, right away. The job took him to old Mexico, for the railroad which made a successful bid for his services was the Mexican Central. Later he made a change which placed him in the chair of superintendent of the telegraph of the National Railways of Mexico.

He left Mexico before that country commenced the present series of internal activities that got it a place on the first page of the newspapers almost every day. The occasion of his leaving was not any clairvoyant foresight of the impending national unpleasant-

Department of Railway Telephones

This department is established as a permanent feature of TELEPHONE ENGINEER. The progress of the art of telephone train dispatching, its technical development, its news, and the elucidation of its mysteries for the non-technical worker will be found each month in these pages. The editors invite the problems and solicit the co-operation of the many readers of TELEPHONE ENGINEER in all parts of the world whose interests lie along these lines.

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ness, but his appointment in 1910 to the post of superintendent of telegraph of the Chicago Great Western Railroad Company, with headquarters at Chicago. And that is where he is now.

G. O. Perkins is an active member of the Association of Railway Telegraph Superintendents. Outside of business he is a fan on music, literature and physical culture. As to his politics, it is hard to say. The music and literature, symbolic of culture, breathe of Wilson; the physical culture certainly suggests the Bull Moose; but how about the initials, which he has had longest of all?

Buffalo, Rochester and Pittsburg Telephones

As a result of the continued successful operation of its telephone train dispatching circuits, the Buffalo, Rochester and Pittsburgh Railway Company has decided to install additional equipment for an extension to the existing telephone lines. The entire equipment is to be furnished by the Western Electric Company, which also supplied the apparatus used in the previous installation.

There will be two separate divisions equipped, with both dispatchers located at Du Bois, Pennsylvania. One circuit will extend eastward to Clearfield, Pennsylvania, a distance of about 20 miles, and the other south to Indiana Junction, and thence to Vintondale, Pennsylvania, branching off at several points. These branches go to various collieries in the anthracite coal region, so that the total distance covered on the Indiana branch will be approximately 100 miles. At the Indiana dispatcher's office arrangements will be made so that when required both train wires can be controlled from the dispatcher's equipment.

The twelve way stations on the Clearfield branch and the thirty on the Indiana branch will be equipped with No. 101-B selector sets containing the standard Western Electric No. 50-B selector. All trains will be equipped with portable telephone sets and line poles so that the train crew may be able to get into touch with the dispatcher from any point on the line. At sidings, wall type telephones will be installed in concrete booths.

Plug boxes, each equipped with a cord and plug, are to be placed outside of various stations along the line. By means of these, train crews can connect their portable telephone sets to the telephone line inside the station without the use of a line pole. Storage batteries, complete with a motor-generator charging set for furnishing talking and signaling current, as well as line construction material for about 130 miles of line, are also being furnished by the Western Electric Company.

Dispatching on the C. & E. I.

The Chicago & Eastern Illinois Railroad is installing telephone train dispatching and message equipment on two of its divisions, from Evansville to Danville, and from Danville to Yards Center, Chicago. The first named circuit is for train service only, while on the Danville to Chicago circuit the dispatching wires are paralleled by a message circuit. The entire equipment is furnished by the General Railway Equipment Company and includes some of the latest developments in auxiliary apparatus for railroad telephone service.

The equipment includes 125 local battery gill selector outfits with the necessary dispatcher's terminal sets and Gill automatic calling keys, wire chiefs' test panels, and full station apparatus. The installation also includes the recently designed No. 1000 transmitter arm, which is not only conveniently arranged as a desk or wall fixture, but possesses advantages in case of replacing the receiver and connecting cords which may be done by the operator, without calling upon the repairman. A motor-generator set, consisting of a 500-watt, 320 volt motor and 350 volt generator is being installed for charging the storage batteries, of which 300 cells of Universal type were furnished for the operation of all the selector circuits.

Activities in British Columbia

The engineers of the British Columbia Telephone Company have selected landings on the mainland and on Vancouver Island for the second submarine cable which the company is to lay under the Gulf of Georgia. This cable will stretch from Point Grey, near Vancouver, to a point in the vicinity of Nanaimo. The landing at Point Grey will be effected on the north side of the promontory, a little to the west of the point where the Canadian Pacific Railroad telegraph cable is landed. On Vancouver Island the landing will be in a small bay on the east side of Newcastle Island, and the narrow channel separating it from Vancouver Island will be flown with high fixtures. The route of the highway will thence be followed to the company's office in Nanaimo.

The permission of the provincial government is being sought for the laying of a telephone cable over the government bridge which crosses the Fraser River at the city of New Westminster. The cable it is proposed to lay across the bridge will have a length of approximately 3,000 feet and will carry some fifty pairs of wires.

New Zealand Revenue Great

The annual report of the Department of Telegraphs and Telephones of New Zealand for 1911, shows that the year's revenue of the telephone exchanges was $895,620 and the revenue for paid telegrams, $1,422,160; total revenue for telegraphs and telephones was $2,396,400. Telegrams forwarded were 9,063,133, an increase of 702,486. On March 31 last, there were 11,805 miles of telegraph lines and 39,370 miles of wire. Thirteen new telephone exchanges were opened during the year, making sixty central and 133 sub-exchanges. The total number of connections was 37,257. On March 31, there were 1,538 miles of telephone lines and 37,872 miles of wire. The report states that Mr. T. Buckley, chief electrician of the Post and Telegraph Department, of New Zealand, who visited America and Europe last year will report to Parliament the result of his investigations of the telegraph and telephone systems in the various countries visited.

Maryland Commission News

Under an order passed by the Maryland Commission, the Telephone Photective Association, composed of business men of Baltimore, won their fight for an extension of six months of the flat rate privileges for telephones, and the members of that organization will proceed at once to gather evidence, which they claim will prove that the telephone company is charging excessive rates here. The order changes a clause in the original order of the commission, and allows the flat privileges to continue from October 1, the time set for their withdrawal, until April 1, 1913.

Maintenance of Railway Telephones

By L. H. Osthoff

EVERY telephone maintainer should have, and probably most of them do have, a system or method of procedure which they follow when making an inspection of the equipment under their care. However, the telephone is young in the railway field, and many roads not yet having a sufficient amount of equipment to warrant the employing of separate telephone maintainers depend upon the division lineman for the up-keep of their telephone plant. It is for these that this article is intended, primarily, and while it is not a detailed manual covering every action which may be necessary to the proper maintenance of railway telephone equipment, it gives in a general way the more important points which should be considered.

All dry batteries should, of course, be measured so that when one commences to run down the fact will be known before it gives out, and it may be replaced before it causes trouble. On the Great Northern road transmitter battery is replaced when it reaches four amperes and the local signaling or bell battery at six. That battery removed from the local signaling circuit is then used on the transmitter circuit of instruments on short local lines to yard-offices, roundhouses and the like. That removed from the transmitter circuits is discarded.

When replacing battery at way-stations and at blind-siding auxiliary sets, particularly at the latter, it is well to take the discarded cells away or make them impossible of further use by knocking the top of the carbon off. This prevents the removal and appropriation of the new cells and the replacing of them with the discarded ones by irresponsible parties.

All cords should be tested for cut-outs and noise, particularly the receiver cord. A cut-out in a receiver cord, while not necessarily dangerous, is very annoying, making it necessary at times to recopy an entire order or message, it not being permissible to interline or overwrite in railway work.

A worn transmitter cord will also cause intermittent trouble making the outward transmission scratchy and blurry, and very hard to read.

The receiver should be examined for dust and dirt, both between the pole pieces and the diaphragm and the cap and diaphragm. If the cord terminal binding-posts in the receiver are screwed down too tight the receiver shell is cracked and the pole-pieces are thus moved further away from the diaphragm, thus cutting down the volume of the sound. If the receiver has become demagnetized the transmission inward will not be as good as it should, and the receiver should be replaced. If the receiver will not hold the diaphragm in place when inverted with the cap off it should be considered demagnetized and replaced. The condition of the diaphragm itself should be noted, and if rusty or bent it should be replaced. Never try to straighten out a diaphragm that has become bent except for emergency use, as the slightest bend or buckle in it will prevent free vibration and result in a consequent cutting down of sound volume. The subset should be examined for loose connections at the binding-posts and cord terminals. This should also be done at the transmission key unless that type using soldered terminals is used. The contacts in that transmission key should be watched to see that they make firmly and are not dirty. A piece of sheet celulloid will be found convenient for cleaning these contacts, as it will not cut the platinum nor leave fibre or fuzz between the points as paper does. If the Western Electric high efficiency transmission circuit is used it is desirable to see that the contact which closes the battery through the transmitter makes before that one which closes the secondary of the induction coil across the line. If this order of closing is reversed a click will be heard in the transmitting station's receiver and those near which is quite severe at stations using a transmitter battery of four to six cells.

When requesting a test ring, if the receiver is left to the ear during the duration of the ringing impulses the condition of the condenser may be determined, if the receiver is in good order. Should the condenser be "short" the impulses will be heard to "crack," while they only make a rippling noise, if such a term is permissible, when the condenser is normal. If, however, the pole-pieces of the receiver are too close to the diaphragm, due to a defective receiver or bent diaphragm, this same effect will be noticed when signaling battery is being sent out. A "short" condenser will make itself known very soon, if near the dispatcher's end of the circuit, by interfering with the ringing of stations beyond, and perhaps near it when the receiver is off the hook at the station where it is located. A simple and quick method of locating a "short" condenser is to cut a milliammeter in series with the battery supply at the dispatcher's office, and then calling each station in turn note the current consumption. After the station has answered and the receiver is off the hook at which the defective condenser is located there will be a very considerable increase in the current consumption, the amount of increase depending on the distance of the station from the battery supply.

When examining the transmitter arm all screws and binding-posts should be tightened and the condition of the hook-switch contacts noted. That the hook-switch is properly performing its function of cutting the receiver and transmitter in and out of circuit may be determined by holding the transmission key in, and with the receiver on the head operating the hook. Many times after a severe electrical storm it will be found that the hook does not operate right. This is because the high impedance of the receiver to the very high frequency current of the lighting discharge causes the current to break down the insulation between the hook-switch springs. This can be repaired temporarily, if no rubber insulation is at hand, by the use of a piece of the paraffinned paper used as a dielectric in telephone condensers. One condenser will furnish several hundred feet of this paper so it is a very cheap as well as efficient make-shift.

On the outside there is little to be done other than to see that the insulation is kept up, and all line joints

made with sleeves if the circuit is of copper, and that all cable and drop joints with the line wire are soldered. If drops are used the knobs should be close enough together where the drop runs down a pole or on a building to prevent the wind swinging it and rubbing the insulation.

In closing let me say that it is well to remember that in all telephone work a loose or dirty joint or contact means trouble sooner or later, and generally sooner.

Ohio Commission News

Application again has been made to the Ohio Public Service Commission for permission to consolidate the Bell and the independent telephone companies' systems at Delaware. The request was rejected last winter because the combine would entail a loss of $1,500 to the independent company, which is to take over the Bell property. No mention is made of the loss in the application last made. The independent company is to pay $10,576.17 for the Bell property and the latter is to retain that portion of the equipment which will not be needed in the operation of the consolidated system. If the sale is made, the Bell Company will serve the independent company with long-distance service.

Advances in trunk line rates by the Central Union Telephone Company have excited protest from a number of business houses at Columbus. Complaint was made to the public service commission with the result that it has been found the telephone company was equalizing its charges or eliminating certain rates which would appear as discriminatory. In its schedule, filed with the state commission the company's rate for a trunk line is $60 and there is no stipulation that this applies to a first trunk and not to second or succeeding trunk lines. There is no other rate named for second or successive trunk lines and the commission could order no other rate.

The State Public Utilities Commission authorized the Home Telephone Company, of Ironton, to purchase the city lines of the Central Union Company for $63,725. Hereafter the Home Company will operate the only telephone system in Ironton, but will furnish long-distance service over the Bell lines. The Home Company has petitioned the commission for permission to break all existing contracts with subscribers and make new ones, and for permission to issue $56,725 additional capital stock and $85,000 bonds.

For the first time since its establishment the commission has been called upon to exercise its authority in requiring a public utility to provide suitable service for the public. Recently Mayor McElroy of Ottawa filed a complaint alleging that the Putnam Telephone Company is not furnishing proper service. At a hearing on the complaint Mr. McElroy described conditions as he saw them, while Secretary M. E. Matthews of the company explained the conditions which perhaps stand in the way of first-class service. Two years ago a very severe storm swept Putnam county and the poles and wires of the company were wrecked. Temporary repairs were made and the wires were strung on anything at hand, but it is claimed that the lines have not yet been permanently rebuilt and, as a result, the service is very poor.

A bond issue of $17,500 has been authorized for the Eastern Ohio Telephone Company by the Ohio Public Service Commission. The proceeds of the sale are to be used in paying off outstanding indebtedness and in making extensions.

Several dispatches from Columbus indicate that progress is being made towards the consolidation of the independent and Bell telephone companies in Ohio. The Public Utility Commission has authorized the Home Telephone Company, of Ironton, to purchase the plant of the Bell Company of that city for $63,725. Application has also been made for a consolidation at Delaware, O., and one at Fremont, O. In these cases the independent companies are buying the Bell plants and the Bell will connect its long distance service with all consolidated companies in all instances. The increased activity in the matter of the consolidation of these smaller companies is believed to be the forerunner of consolidations among the larger companies of the state, including the Cleveland, Toledo, Dayton, Youngstown, Columbus and other companies.

The commission has promised to send its engineer to Fremont to investigate the telephone situation. The commission heard the petition of the Fremont Home Telephone Company, asking permission to sell an additional $25,000 of the capital stock. This is the first step towards a consolidation of the two telephone exchanges. The city council has gone on record as opposed to any increase in rates.

Appeal has been made by the Hamilton Home Telephone Company from the decision of the public service commission refusing to compel service connections by the Cincinnati and Suburban Bell Telephone Company with its lines. It was shown by the latter company before the commission that they had a plant in Hamilton and service connections with the Home Company's lines would destroy its property value. The latter company says in its suit that it has 3,700 subscribers who desire to communicate with Cincinnati, but that the Bell Company refuses to interchange messages and is in a conspiracy with the American Telephone and Telegraph Company.

Virginia Commission News

Application has been made to the Virginia Corporation Commission for a change in the name of the Southern Bell Telephone and Telegraph Company to the Chesapeake and Potomac Telephone and Telegraph Company of Virginia. The application was made by Allen Caperton Braxton, several of the officers of the company appearing in connection with the matter. Mr. Braxton said that the change was in pursuance of the recent transfer of the Virginia concern to the concern which will bear the changed name. The principal office of the company will be in Richmond instead of Atlanta, as heretofore.

The application of the Virginia-Tennessee Telephone Company to be permitted to raise its toll rates at Roanoke, Va., has been presented to the commission.

Washington Commission News

The Sumas chamber of commerce has written the Washington State Public Service Commission of the Farmers' Mutual Telephone Company of Whatcom county to residents of Sumas and vicinity, saying it is also impossible to converse with Bellingham and with surrounding places. The chamber says the switchboard facilities are inadequate and the equipment also, and that the subscribers and stockholders many of them express the opinion that the company's rates should be increased and a more adequate system installed.

Telephone History of the L. & N.

By Clifford Weldon

SINCE 1907, when the first telephone train dispatching circuit was installed on the New York Central and Hudson River Railroad lines from Albany to Fonda, N. Y., there has been a steady increase in the number of railroads, both in the United States and Canada, which have adopted this type of equipment.

After the first few trial telephone circuit installations had been operated long enough to permit of a definite and decisive comparison between the telegraph and telephone methods of handling train movements, there remained little doubt, in the minds of the railway officials concerned, as to the part which the telephone was to play in the future of this very important branch of railway operation.

The advantages in favor of the telephone, which were immediately apparent to those who observed the first trials closely, are that it is more flexible, quicker, safer and more reliable. In addition to these, it makes possible better discipline and co-operation, as well as providing a means for officials, not familiar with the Morse code, to exercise supervision and obtain immediate and accurate information in case of emergency.

Some of the factors which increase the traffic capacity and therefore make for economy in the telephone method of operation are:

First. The time of calling stations, sending orders and receiving train reports is so greatly reduced (30 to 50 per cent) that the time gained is available for the dispatcher in better laying out his work, planning meeting points and handling the endless amount of detail which the position requires.

Second. Dispatchers are more efficient, due to the fact that they are relieved of the mental and physical strain attending the continual operation of the Morse key, which has a most damaging effect on the nervous system and frequently results in what is known as operators' paralysis.

Third. Through the use of the portable and siding sets train crews may get into communication with the dispatcher and receive their advance orders directly from him. This has proven a most valuable branch of the service, especially in advancing freight trains which have taken a siding some distance from a station or tower. Also, during the night, when, on some roads, part of the stations are closed. In this latter case the train conductors may be provided with keys and in that way have access to the dispatching telephone.

Fourth. The dispatch and exactness with which reports of progress on clearing up wrecks and repairing breakdowns is given to the dispatcher, thus allowing him to determine as to the handling of other trains, routing them over other roads, etc.

These advantages were so patent that the progressive railroads in the United States made preparations to replace, as rapidly as possible, the telegraph equipment by the telephone and selective signaling telephone systems. Some idea of the rapid spread of the use of the telephone may be gained by stating that there are at present installed telephone circuits for handling train movements over approximately 65,000 miles of railroads in the United States and Canada.

One of the most progressive railroads in this country is the Louisville & Nashville Railroad, which covers the great central south from St. Louis and Cincinnati to the gulf. This road, covering as it does the states of Indiana, Illinois, Tennessee, Kansas, Ohio, Virginia, West Virginia, Alabama, Georgia, Louisiana, Florida, Mississippi and North Carolina with a network of tracks, is destined to play a most important part in the development of this very important territory.

The Louisville & Nashville Railroad Company recognized at the outset the advantages to be obtained by the use of the telephone, and in 1909, installed its first telephone train dispatching circuit from Louisville to Cincinnati. The results obtained from the operation of this division were so satisfactory that plans were immediately made to extend the telephone and selective signaling system. Today the Louisville & Nashville operates approximately 4,600 miles of road and of this there is equipped for telephone train dispatching service approximately 2,539 miles.

Telephone equipment has been installed between Cincinnati, Ohio and Louisville, Kentucky; between Louisville and Bowling Green, Kentucky; between Evansville, Missouri and Earlington, Kentucky; between Owensboro and Russellville, Kentucky; between Cincinnati, Ohio, and Paris and Livingston, Kentucky; between Lexington and Whitesburg, Kentucky; between Louisville and Norton, through Corbin, Kentucky; and between Corbin, Kentucky and Etowah, Tennessee, through Knoxville.

The greater portion of this telephone operated mileage is covered by both train and message circuits. The installation of the two parallel circuits provides sufficient facilities to operate under the most trying traffic and service conditions. All of the telegraph and telephone work on the Louisville & Nashville has been for years under the personal direction of R. R. Hobbs, who has had the title of chief operator. The very competent and efficient manner in which Mr. Hobbs has conducted the telephone and telegraph work for his road is demonstrated by the efficiency of the service over which he has supervision. Mr. Hobbs has taken every advantage of the outside wire plant which has been so constructed as to make possible the use of simplex and phantom service over the train and message wires. This additional simplex and phantom service is obtained without any increase in the outside wire plant and with but a very slight cost for the apparatus necessary at the terminal of the circuit. The railroad company has recognized the service which Mr. Hobbs has always rendered and they have recently assigned to him the title of superintendent of telegraph.

Litigations of Telephone Company End

Litigation over the losses of the United States Independent Telephone Company, of Rochester, N. Y., has been ended by an agreement through which investors in the enterprise will receive $1,500,000 or about 58 per cent of their losses. The directors of the company will contribute the funds. Attorneys for the investors will receive 35 per cent, or $525,000 of the amount recovered.

Telephone and Telegraph System of Russia

The number of telephone lines maintained by the Russian Government is 99, according to Consul General John H. Snodgrass of Moscow. The result of exploitation of the Government city telephones in 1909 will be seen from the following schedule (verst=0.663 mile):

Ninety-nine Lines.	1908	1909	Increase or Decrease.	Per cent.
Length of line.....versts	7,541	7,749	+ 208	+ 2.7
Length of wires.....versts	79,583	86,091	+ 6,508	+ 8.2
Stations .....number	237	248	+ 11	+ 4.6
Subscribers .....number	37,812	41,957	+ 4,145	+10.9
Apparatus .....number	38,804	42,206	+ 3,402	+ 8.7
Gross expense.....	$ 774,445	$ 623,218	—$151,227	—19.5
Gross profit	1,370,855	1,499,147	+ 128,292	+ 9.3

The area covered by these telephone lines was 6,280 square miles, with a population of 2,500,000.

Of the lines connecting different cities, the first place belongs to the St. Petersburg-Moscow line (415.3 miles). In the year 1909, 275,592 one-minute conversations took place; the gross profit amounted to $86,684; the expense being $24,772, a net profit resulted of $61,912, or about 27 per cent on the capital invested.

Of the private telephone companies, the most important operate in the principal towns of the Empire—Baku, Warsaw, Windau, Moscow, Melitopol, Mitau, Nizhni Novgorod, Odessa, Riga, Rostov, Sestroregk, St. Petersburg, Taraspol and Terrijokki. The results of the exploitation of these lines is shown in the following schedule:

Fourteen Lines.	1908	1909	Increase	Per cent.
Length of lines .....versts	2,006	2,627	621	30.9
Length of wires .....versts	240,938	272,738	31,800	13.2
Stations .....number	109	136	27	24.8
Subscribers .....number	76,653	88,687	12,034	15.7
Apparatus .....number	76,561	89,508	12,974	16.9
Gross expense.....	$1,406,384	$1,449,594	$ 43,210	3.1
Gross profit	2,574,814	2,019,587	344,778	13.4

The area covered by these telephone lines was 1,094.5 square miles, with a population of 6,000,000.

Besides these there were 529 local lines (in towns), 133 government and district lines maintained by zemstvos and 28 lines connecting different towns, representing a total of 26,758 miles of lines, 50,040 miles of wire, 10,729 stations, 31,064 instruments. Area covered, 455,462 square miles, with a population of 11,270,288; gross profit, $569,757; gross expenses, $625,761.

The government telegraph lines cover 108,880 miles, with 292,994 miles of wire. During the year under review there were added 2,852 miles of line, with 7,316 miles of wire, an increase of 2.7 per cent of line and 2.5 per cent of wire. The total number of telegraphic apparatus of different systems was 8,203, or 394 (5 per cent) more than in 1908. Telegrams numbered 33,516,196, or 11 per cent more than in 1908. Of these 28,523,000 were inland messages and 4,993,000 were exchanged with foreign countries. The former show an increase of 10.6 per cent, the latter of 13.5 per cent.

Of the telegrams exchanged with foreign countries, 2,072,000 were sent abroad from Russia, 2,442,000 were received from abroad, and 479,000 were transit telegrams. There is a considerable increase to be noted in all three of these classes, i. e., 13.8 per cent in the first instance, 14.3 per cent in the second, and 7.8 per cent in the third.

The total number of words telegraphed was 463,116,000, of which 87 per cent belonged to inland and 13 per cent to foreign telegrams. The average length of each telegram was 13.81 words.

With regard to the international exchange of telegrams, regulations established at the Lisbon Telegraph Conference provided for a reduction of the rate for telegrams exchanged in Europe. The regulations were supplemented by instructions regarding the business hours of telegraphic offices (including radiotelegraphic stations), code telegrams, sending numbers and fractions, etc.

Telephone Girls Get $100,000 Raise

If the telephone girl in San Francisco, Cal., calls "Number please" with an additional note of sweetness these days it is because—taken collectively—she has just received a "raise" of $100,000. It may be that the telephone company has come to a realization of her worth through the clever acting of Wanda Kelly, the telephone heroine who proved the power of the operator in the switchboard tragedy, "The Woman." But it is more probable that the raise has something to do with the supervisors' telephone rates committee and its agitation for more efficient service.

So payday promises each a share of the $100,000 increase in salaries which the Pacific Telephone and Telegraph Company has made effective. Supervisor Fred L. Hillmer, chairman of the supervisors' telephone committee, was notified of the increase by Superintendent J. A. Halliday of the telephone company. Hillmer and other members of his committee have had frequent sessions with the telephone officials in regard to general complaints of poor service, and have urged the company to increase its plant and force or take other necessary means to improve conditions.

"We are gratified at this news of the $100,000 increase in salaries of the company's employees," said Hilmer, "as it promises to give greater efficiency. Other employees besides the operators will receive the benefit of the raise, and better paid employees mean better service."

The company also is installing a large number of extra switchboards and taking on many new operators.

Contract for Foreign Telephone Construction

From Consul L. J. Keena of Florence, Italy, comes the information that as the result of a meeting of representatives of the communes below mentioned, a contract has been signed for the construction of telephone lines to connect the communes of Asciano, Buonconvento, Cetona, Chianciano, Chiusdino, Chiusi, Montalcino, Murlo, Pienza, Radicofani, Radicondoli, San Casciano dei Bagni, San Quiricod Orcia, Sarteano, Sinalunga, Torrita, and Trequanda.

Application for the government concession for the building of these lines has already been made. The contract calls for the completion of the lines within six months after the date of the government concession. The name of the contracting company may be had from the Bureau of Foreign and Domestic Commerce at Washington.

Transmits Music by Telephone

The New York Magnaphone & Music Company has inaugurated the central station generation and distribution of music, thus carrying out a scheme proposed by Edward Bellamy in his book, "Looking Backward," published in 1887. The music in this case, however, is produced by motor-driven phonographs operated at the Music Exchange, Broadway and West 111th Street. Each instrument operates in connection with 100 telephone transmitters.

Of Interest to the Trade

By A. L. Haase

An Interesting Lineman's Test Set

Stewart Brothers, telephone engineers, have produced a test set that reduces the science of testing to the work of one man, the lineman on the line. The set has all of the needed features to produce a perfect test with the efforts of the lineman and without the use of mathematics. It is capable of telling which way to go and approximately how far to go to get to the trouble. To understand the convenience of the set one has only to look at Fig. 1. Its size is 4½x6½x9 inches.

The set has all of the apparatus needed to call the operator or a subscriber, while out on the line. One good feature is that the transmitter is protected from pole vibration and wind noises. When in the correct position of the set attached to lineman while talking to the other party. This position is brought about by a ring and hook in the shoulder strap, which shortens the strap so as to bring the set in the best operating position, allowing the free use of both hands. The set being at rest across the chest of the lineman, causes the transmitter to be operated by the breast vibration, or if he desires he can talk down toward the top of the set and operate the transmitter the same as in a telephone.

The two line cords to be attached to the line with snaps, when not in use can be placed in opening at the end of top of set to protect them from breakage. The receiver when not in use is placed in this opening also.

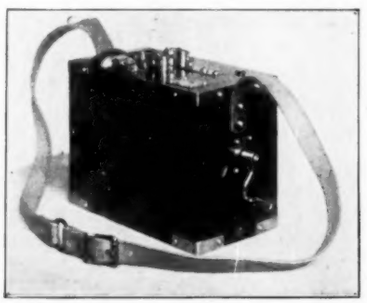


Fig. 1.

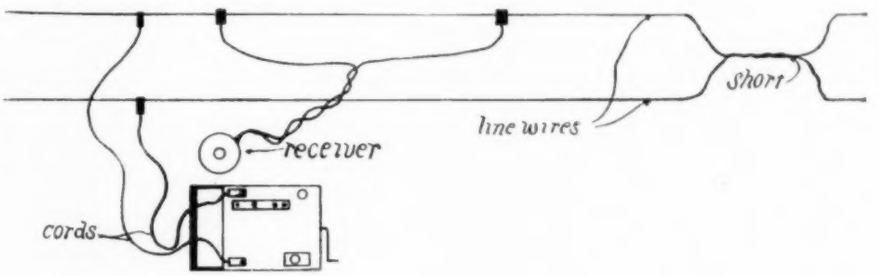


Fig. 2.

By the use of a special lamp in this set one can tell if there is trouble on the line and approximately how far it lies from him, which feature is worth a great deal in determining what livery is needed and whether it is a day's drive, a short trip or only a walk. As an example, if the trouble lies, say about eight miles from the office and the generator crank on set is turned, after line cords are attached to line, the lamp will burn dim, but should the trouble be near the office or point of test, the lamp will burn very bright. The principle of the test being, that the nearer you are to the trouble the brighter the lamp will burn. As one gets nearer the trouble the lamp will burn brighter than at the test made back of you. The lamp is so arranged that it will not light through the telephone bells even though there be as many as fifteen on one line.

The best feature of the set is in telling when you have passed the trouble, or if the trouble is down a branch line or still ahead on main line, without cutting a wire. You can meet a line anywhere in its length and tell which way to go for the trouble without opening the line. By placing the receiver on the wire as shown in Fig. 2 and turning on generator crank you will hear a distinct, clear ringing noise in the receiver, on the side towards the trouble. Will explain the method of locating the different kinds of trouble by the use of this set, using examples in each case.

To locate a short circuit, place one snap of each line cord on each wire of the line that is shorted. Then by turning the crank and noting the brightness of the lamp you can tell approximately how far it is to the short. The receiver should be attached to the set when testing with the lamp. The lamp will just show a dim red glow on a 1,000 ohm short, or equal to a line of No. 12 iron, short sixteen miles from the tester.

One will become very accurate, with a little practice, with this method of testing. After you have determined about how far the trouble is from you, go out on the line, making a test every now and then as you go each time noting if the lamp burns brighter than at the last test. When you get to a point at which the lamp burns bright you can then test as shown in drawing and tell whether or not you have passed the trouble, and if you come to a branch line you can tell without cutting the wires whether the trouble lies down that branch or is on ahead on the main line.

By putting the receiver on one line wire, as shown in Fig. 2, and turning the crank you will hear a distinct ringing noise in the receiver in the direction of the trouble. This noise is produced by the current passing through the trouble, therefore it is easy to see that if the line cord were placed on the other side of the receiver clips there would be no sound in the receiver, because then the receiver would be on a part of the line through which no current would flow.

To locate a cross between two wires on the same lead, locate the same as if it were a short, only use the two crossed wires in the test. To locate which two wires are crossed, connect set to two wires, one on each line, and turn crank, and when you get the two crossed wires the lamp will light, and not until then.

To locate a ground on a line put one snap on a ground (be sure it is a ground) at some point where a ground connection can be made, and put the other snap on the

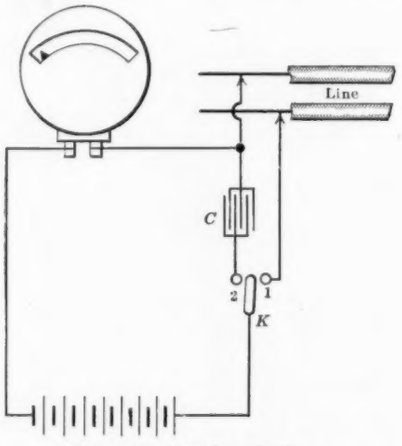
grounded wire, of the pair. To find the grounded wire use the lamp. With one snap on the ground try the other on each of the wires of the line in trouble, one at a time, and the one that gives you the light is the grounded wire. In locating which way the ground is, put the receiver on the grounded wire, and ring with the line cord, first one side of the receiver and then on the other, which ever way the receiver clips are from the line cord when the loudest noise is heard in receiver, the trouble is in that direction.

It is sometimes the case that tree leaks are scattered on a line along with the cross or dead ground that you are looking for, and these leaks will cause a slight noise to be heard in the receiver on the side away from your trouble; but by following the loudest noise you will always go to your trouble. The set will test fuses or for opens in telephones, or for short circuits in ringer coils.

Wire Chief's Testing Voltmeters

The telephoning public is very much more critical with respect to the service it demands than was the case even two or three years ago. This condition is due to the education it has received owing to improvements in service in large communities and also to advertising campaigns conducted by telephone companies. Consequently the daily problems confronting the managers of all exchanges, whether large or small, are constantly becoming vastly more rigorous.

Many factors have contributed to the increased efficiency of service that has already been acquired; but

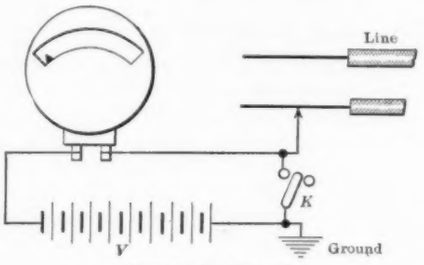


Measuring Capacity of Line.

there is perhaps no more important detail of apparatus or equipment than the voltmeter known as the wire chief's testing instrument. A satisfactory instrument especially designed and very widely adopted for the purpose of facilitating the duties of wire chiefs is one made by the Weston Electrical Instrument Company, Newark, New Jersey. It enables wire chiefs rapidly and accurately to make a number of determinations that are of vital importance to good service.

The instruments are usually of the round pattern switchboard type and are mounted on the testing board. They are made with a very high internal resistance, the most common specifications calling for a range or scale of 40 volts and a self-contained resistance of 100,000 ohms. The instruments are also made with double-voltage ranges and for some purposes are prepared in portable form.

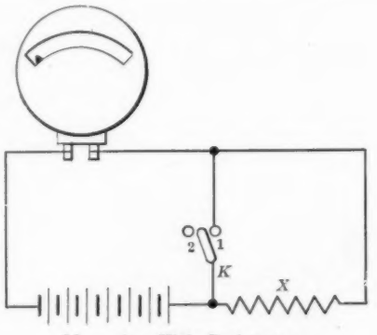
There are certain tests, such as measurment of high and low resistances, tests for capacity and tests for ground which it is of great importance to determine accurately in substantially every telephone exchange, and the connections and descriptions of those particular



Testing for Ground.

tests are briefly given in order to indicate the serviceability of the instrument.

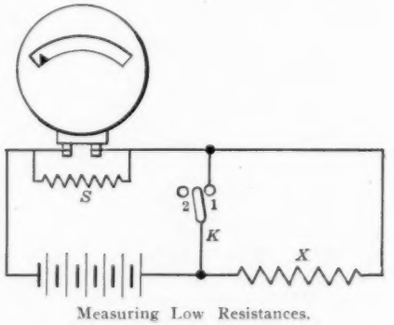
The advantages and economies resulting from the use of the wire chief's voltmeter are such that they should be carefully investigated by managers and wire chiefs, providing such instruments are not already installed. In-



Measuring High Resistances.

deed their accuracy, durability and general serviceability will prove a revelation to those who have never hitherto used them.

It is needless to caution prospective investigators that any instrument, upon which so much dependence is placed, should be of the highest grade of electrical and mechanical workmanship and design. It will be found that high-grade instruments can be purchased at a reasonable price and it has usually proven to be poor



Measuring Low Resistances.

economy to purchase any inferior grade of instrument for this character of service.

That the value of such instruments is not generally understood is testified to by the following extracts from

a letter, which is typical of correspondence frequently received.

We are more than pleased with the voltmeter (wire chief's) as we have already located grounds on our lines that we did not know existed.

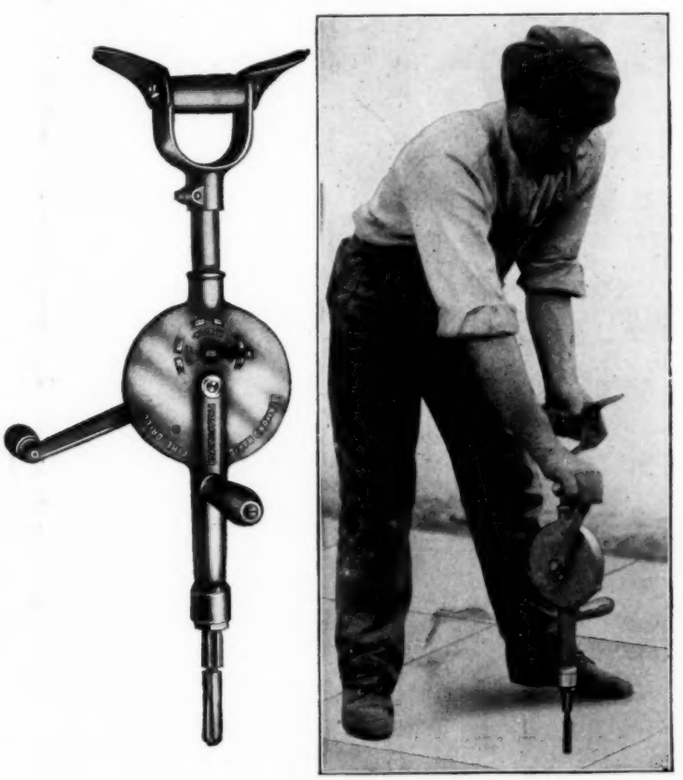
I think that if you would use the wiring diagrams such as you sent me showing how simple it is to make the different tests —that more small exchanges would be equipped with a (wire chief's) voltmeter.

I supposed wire chief's instruments were intended only for large exchanges and for men who knew all about this class of instruments and testing, and not for rural exchanges.

The Diamond Rapid Fire Drill

The Diamond rapid fire drill is designed to reproduce the same action in the drilling of holes in stone, brick or cement as is produced with the ordinary hand-hammer and drill with greatly multiplied speed. The hammer's action upon the drill and the drill's action upon the stone is identical with that produced in the old way with the ordinary hammer and steel drill with eight times the rapidity. With every revolution of the crank eight sharp blows are struck.

It is an acknowledged fact that the best results



The Drill and the Way It Is Used.

obtained with the old method of hammer and drill are produced by comparatively light blows properly timed and struck. The "rapid fire" drill was designed on this theory to strike according to the speed with which the crank is rotated from eight to twenty times the number of blows that are regularly delivered with an ordinary hand-hammer and a corresponding increase is produced in its rapidity in drilling holes. Its action is precussive and its mechanism is so constructed that practically no vibration or concussion is felt by the operator. Its combination of handles are arranged to adapt the drill to use in any position that may be required. By the loosening of a screw underneath the D handle the handle is thus allowed to rotate and may be used as a breast plate, permitting the drill to be rotated in the hole to insure perfect clearance of the drill when in action. When used in this position the forward handle is slowly turned back and forth, giving about a one-eighth turn, preventing the drill point from binding in the stone.

The drill points are standard, and all sizes are furnished with identical taper shanks, so that any size may be used interchangably. It is found that the drill points used in the Diamond rapid fire drill will remain sharp considerably longer than the same points held in a drill holder and subjected to blows of a regular stone hammer.

Each "rapid fire" drill has three adjustments, hard, medium and soft, controlled by a spring lever at the side of the housing, and each is furnished with two springs of different power, thus allowing six gradations to the force of the blow that can be delivered by the hammer. The springs are easily changed by removing the cover of the housing without disarranging or unfastening any of the parts of the mechanism.

Holes drilled with this machine have a smooth bore and a sharp edge and there is no danger of cracking the wall at the surface. The saving in time and in the longer service of the drill points will more than pay for the cost of this machine in a short while.

The Value of Resource

The destruction wrought by the fire, which on August 15 left the business section of Indianapolis without independent telephone service, gave the long distance telephone an opportunity of showing its worth in an emergency and the Western Electric Company another opportunity to show what its stock resources could do in aiding in the rapid restoration of telephone service. The fire, which broke out in the terminal room of the Indianapolis Telephone Company's main office, destroyed most of the cross connections on the main distributing frame; about 650 switchboard cables; all the truck cables between five other exchanges, and cut off the business section.

A representative of the Western Electric's Indianapolis distributing house, who arrived on the scene as soon as the fire apparatus, placed the switchboard installing force and the warehouse facilities at the disposal of the telephone company. The offer was accepted and at eleven o'clock that evening the first call for material was made. In thirty minutes 15,000 feet of switchboard cable and installing accessories were delivered.

In the meantime, the long distance wires between Indianapolis and the Western Electric Hawthorne plant were busy. Six men of the Hawthorne installation force were requisitioned and at nine o'clock the next morning 5,000 additional feet of switchboard cable were on the ground and within forty-eight hours there had been delivered 20,000 feet of switchboard cable, 100,000 feet of flame proof jumper wire and large quantities of miscellaneous material.

The following letter from the general manager of the Telephone Company speaks for itself:

A. M. Collins, Sales Manager, Western Electric Company, Indianapolis, Indiana.

I want to thank you and your employes for the courtesy shown the Indianapolis Telephone Company at the time of the recent fire, which burned out the entire main distributing frame in the central office.

Our company is particularly grateful to the Indianapolis

representative, who practically threw open the entire sales room, giving us access to anything which we could use. We were also helped out to a considerable extent by giving us some of your most capable men.

In conclusion, permit me to say that words do not adequately express the appreciation the management of the Indianapolis Telephone Company feels for the promptness with which your company supplied us with material.—E. L. CLINE, *General Manager.*

A Steel-Clad Cord Weight

A steel-clad cord weight for telephone switchboard use, developed and manufactured by the Western Electric Company, has effectually solved the problem presented by the battering which cord weights undergo when in use.

This cord weight, which is known as the No. 116, has a two-piece electro-galvanized steel shell, firmly riveted to prevent spreading. The shell is filled with lead to give the required ten ounce weight, and is so shaped that it presents no sharp corners to damage other weights with which it may come into contact.

Steel Clad Cord Weight.

The No. 116 cord weight, because of these constructive features, does not become battered up in service and is a distinct improvement over the old lead filled brass shell type which, after being in service a year would almost invariably become a shapeless and practically useless mass of metal. This distortion is not possible with the steel-clad No. 116.

Another feature is the cord surface of the pulley. This pulley is of hard brass with a smooth polished surface, so that wear on the cords is reduced to a minimum.

A Novelty at the Boston Electric Snow

One of the features of the Boston Electric Show, which opened on September 28, was an exhibit of Western Electric loud speaking telephones.

For some time past that company's engineering department has been at work on the development of these instruments, combining the articulating qualities of a telephone receiver and the sound intensifying qualities of a megaphone. A short time ago the instrument was perfected, and ninety were accordingly installed in various parts of Mechanics Hall, where the show was held.

The Loud Speaker

The loud speaking telephones were divided into groups of ten, making nine separate circuits, which were originated in a sound-proof, glass-enclosed booth in the basement of Grand Hall. In this booth the special transmitters were located, as well as an ordinary telephone set connected to the lines of the New England Telephone and Telegraph Company.

The installation of the telephones was made to demonstrate their use as announcers—to announce interesting events about to take place, to page visitors to the show, and to furnish music from a phonograph in the transmitting booth. An equally important use to which they were put was to announce the inning-by-inning scores of the World's series baseball games, a feat made possible by the co-operation of the New England Telephone and Telegraph Company and one of the leading Boston daily papers.

It was a curious sight to see a group of people gathered around one of the telephones, either at the Western Electric exhibit in the main hall or in various parts of the building, listening open-mouthed to the voices or music coming out of the horns, seemingly from

Listening to the Loud Speaking Telephone.

nowhere. That the telephones produced practical results is evidenced by the fact that a child, which had been separated from its parents in the throng, was found through their agency; and it was no unsual thing for exhibition officials to be summoned to their offices or to meetings by means of these instruments.

The efficacy of the telephones in producing music

The Western Electric Booth.

transmitted from the phonongraph in the basement booth may be adduced from the fact that Creatore, the famous Italian band master, protested that they interfered with the music rendered by his band. Accordingly arrangements had to be made to use the telephones for furnishing musical selections only during the band pauses.

Demonstrations of the Western Electric-Sturtevant

vacuum cleaners proved one of the magnets of the show. The stationary type was shown in operation, as were the three types of portable machines now on the market, known as numbers 1, 2 and 3 cleaners.

Inter-phones, telephones in general, electric heating devices and miscellaneous electrical supplies were also exhibited at the Western Electric booth.

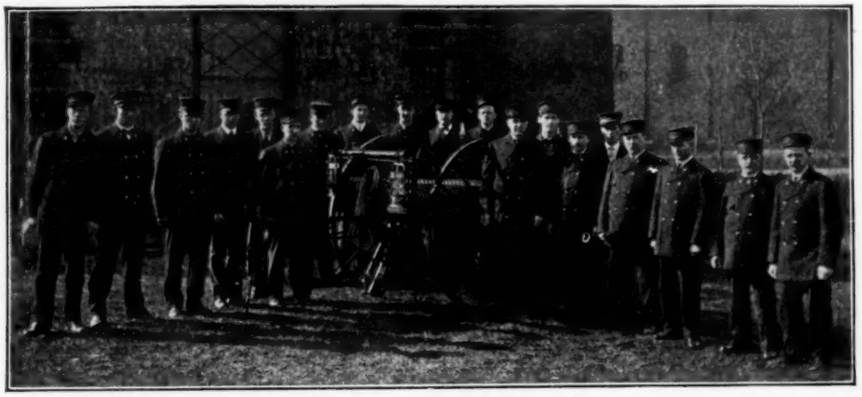
Insuring the Country's Telephone Service

In a recent article on "Fire Protection at Hawthorne" the *Western Electric News* makes the statement that while a large fire would be very serious for the Western Electric Company, it would be disastrous to the various affiliated telephone companies which are supplying service to the American public. Upon them and through them upon the public would fall the heaviest burden of loss.

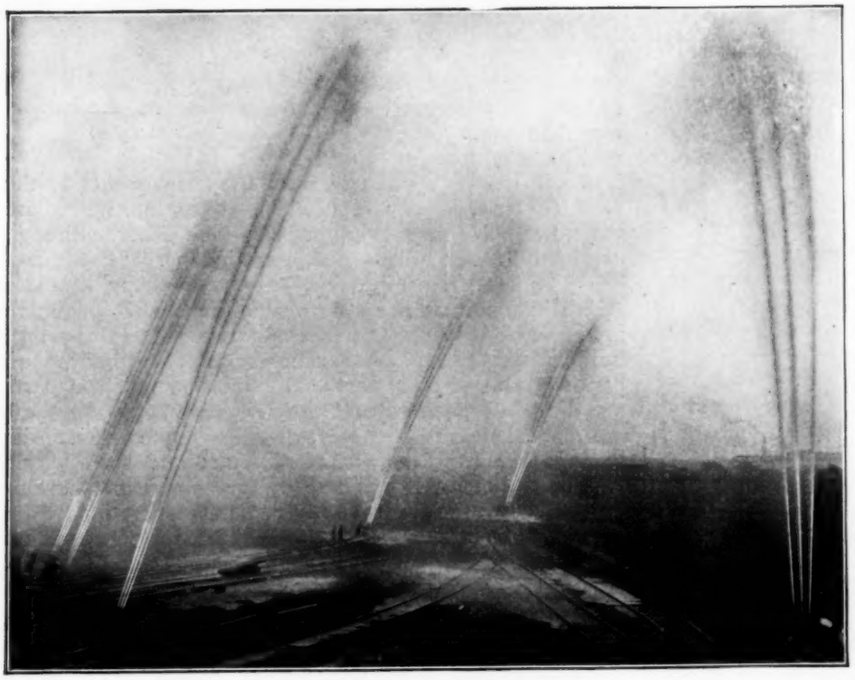
The means taken to prevent large fires and to combat fires which may break out, have elicited the declaration from every fire protection expert who has visited the big plant that "Hawthorne cannot have a serious fire."

Water is supplied by two enormous reservoirs which hold water enough to supply ten city fire engines with all they could discharge in ten hours. In place of the city fire engines, however, there are three large fire pumps of the same capacity as a large city engine. In the water tower two large sprinkler tanks have been installed with an additional tank on a trestle in the lumber yard. These tanks discharge into the underground system and act ahead of the pumps. The underground system is equipped with hydrants, each of which has a full complement of nozzles and hose.

Most fires have very small beginnings and can be put out with less than a pail of water if time permits. In order to reduce this time element, pails of water, chemical extinguishers and lines of garden hose are scattered throughout the buildings. To cope with incipient oil fires, pails of sand and bicarbonate of soda are distributed at strategic points.



The Hawthorne Fire Company.



The System in Operation in the Lumber Yard.

One of the Stationary Nozzles.

Sprinklers would prove impractical in the lumber yards, and hose streams operated by trained men are necessary. The fire department has, therefore, been organized. It consists of a chief, formerly chief of the Rock Island (Illinois) fire department, with six men by day and fourteen men by night. The day force is a regular paid force, which is in the fire house all day ready for instant fire duty. A volunteer fire brigade, however, recruited from the janitors, reports to the fire house at each alarm, to be held in reserve in case a second fire should break out while the regular force is absent. The night force act both as watchmen and as a fire department. One half sleep in the fire house until midnight and are subject to calls for fire duty while the other half patrol the buildings and grounds.

At the lumber yards, large streams of water are

necessary. To provide for these, two turret monitor nozzles have been set up in protected corners of buildings overlooking the lumber yards. The nozzles are connected to the underground system. Besides these stationary nozzles there are ten connected to hydrants, to be handled by the men and moved from one point to another.

A fire department, however, in its headquarters, is only of potential value as protection against damage from a fire in the plant. To make this value actual, a fire alarm system is in operation, with boxes in every part of the buildings and grounds.

It has cost large sums of money to perfect this fire system and it requires constant vigilance. It necessitates rules and instructions so many in number and frequently so extreme in character as to be considered a burden by the foreman; but there cannot be a shipment delayed on account of fire, for Hawthorne cannot have a serious fire.

Western Electric's New Indianapolis Home

The Indianapolis office of the Western Electric Company is shortly to move into new quarters, which have been leased at 121 South Pennsylvania street.

The new building, which contains 31,000 square feet of floor space and is five stories high, is better adapted to the needs of the local organization than the old building which it has occupied for the past five years.

New Indianapolis House.

A retail store is to be opened on the ground floor of the new house, for selling everything electrical — for business, factory and home use. The store will be but two squares from the principal retail street of Indianapolis—Washington street —and will, therefore, be quite convenient for the retail trade.

The remaining floors will be used for offices and warehousing. There will be complete stocks of electrical apparatus and supplies.

It is intended to have the new building serve as a distributing point for material intended for the use of the Central Union Telegraph Company.

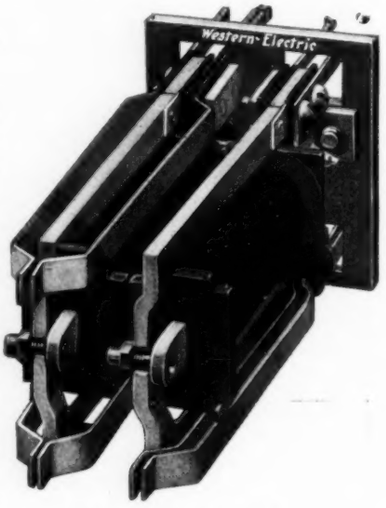
Report on Canadian Telephone Situation

The first report of the Canadian Department of Railways and Canals, dealing with telephone operations in the dominion, states that the total number of telephone organizations is 537. Of these, Ontario contributes 319, Quebec 32, New Brunswick 16, Nova Scotia 14, and Saskatchewan 143. In Alberta and Manitoba practically all the separate companies which existed a few years ago have been merged under government control, and in Saskatchewan the process of absorption is under way. The total number of telephones in use is 302,759. The gross earnings of all the Canadian companies amounted to a little over $10,000,000; operating expenses were almost $7,000,000, leaving net earnings of slightly over $3,000,000. The equipment of all the companies' lines includes 687,728 miles of wire. The total number of employees reported was 10,425, who received $915,636 per year.

A New Telephone Relay

The constant quest for new and better ways to do the old things has brought about the development of a new telephone relay by the engineering department of the Western Electric Company. The new relay, which is of the type known as the "line and cut-off" and designed primarily for switchboard equipments, has been designated with the code number "194."

The aim underlying the development work was to produce a relay which could be sold at a lower figure and still be better than the line and cut-off relay known in telephone circles under the code number "163." This aim has been attained.



The New No. 194 Relay.

The No. 194 relay is made entirely of punchings. Numerous installations have already shown that, from an operating standpoint, the new relay possesses many advantages, principally that of being easier to adjust over lines of varied length. The maximum line resistance over which it can be adjusted to operate satisfactorily is greater than that over which most other relays will work. As it will meet the adjustments of the No. 163 type, it may be used in old equipments where the new and old must align with each other, although originally designed for new installations.

The No. 194 type relay possesses many features which stamp it as the superior of the No. 163. There are no knife-edge armatures, contacts are more accessible, number of parts is smaller, it occupies less space and can be mounted on a narrower mounting, all iron parts are electro-galvanized and the line part is of the same mechanical design as the cut-off part of the relay. The wirings are of black enameled wire; and atmospheric conditions, such as high temperature and excessive humidity have practically no effect on its operation. The new relay is light and little liable to jar out of shape and adjustment. The springs and terminals are well separated, making adjustment and inspection simple and expeditious.

A Telephone Call Register

Dr. H. L. Warwick, of Fort Worth, Texas, has invented and patented a device to be used in connection with telephones that he thinks will prove of great advantage to the public. The device is what is known as a telephone register, which, when attached to a telephone, will preserve the numbers of those who call during the

absence of the owner. The attachment is somewhat similar to a stock market register, and the numbers are recorded on the tape, so that the telephone owner who leaves his phone may learn when he comes back who has called during his absence. The idea embodied in the invention occurred to Dr. Warwick one night when he returned from the theater and learned that a number of his patients had called him by phone during his absence.

Telephone Company Rewards Operators

Several hundred girls employed by the New York Telephone Company received checks on October 21 for amounts ranging from $25 to $100 as bonuses for good work.

Announcement had been made on bulletin boards in the various exchanges throughout the city that every girl who performs her duties faithfully and satisfactorily enough to stay in the service for two years will receive $25; that those who remain from two years to nine will be paid $50 as an additional reward, and that those whose terms of employment extend beyond nine years will receive $100.

The company holds out the offer merely as an extra inducement that every young woman who enters its employ may feel she is working for something in addition to her regular salary. The company covers a large field, and it is said that as its employees are being drawn on constantly for positions which assure them easier hours, it felt it could meet the situation by an additional incentive for good work and long service.

The first batch of volunteer gifts went out to girls who had passed the time necessary in the various classes. These gifts will be followed by other checks as soon as the young women reach the different milestones. Nearly one thousand girls are benefited by the bonuses, and it is believed that $35,000 will be given away the first year in meeting this new idea of the directors of the company.

Municipal Telephone Plan for Cleveland

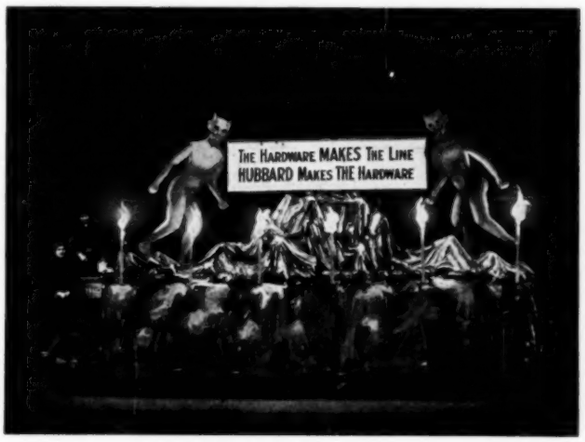
Allen C. Morse, formerly chief engineer of the Cuyahoga Telephone Company, Cleveland, and now consulting engineer to the mayor of that city, has completed a plan to establish an independent municipal telephone system. It is estimated that such a system would cost $6,500,000, and that such an expenditure would care for 65,000 subscribers. This is about the number of subscribers to the Bell and Cuyahoga Telephone Companies, which now operate in Cleveland. Mr. Morse has discouraged the idea of the city buying either or both of the old properties. He said that if this were done it would be impossible to reduce the rates to as low a level as if a new system were constructed. He says that with a new system the city will be able to establish a rate of 1½ cents per call. He favors the installation of an automatic or semi-automatic system. It is expected that Mayor Baker will take definite action on the telephone proposition after November 15, when the new home rule amendment to the constitution becomes effective.

Connect Germany and Italy by Telephone

It is expected that the direct telephone line between Germany and Italy, via Switzerland, will be opened for service in the near future. Owing to the great distance the size of wire chosen is 4½ mm., but the charges for use are comparatively low. The transit line from frontier to frontier in Switzerland has been carried out by the Swiss Telegraph Authorities at their own expense, and Switzerland will levy a charge of two fr. for each conversation of three minutes. On the other hand, Germany and Italy will each make a charge of from one fr. to two fr., according to the zone in which the town is situated whence it is desired to speak. During the night the charges will be reduced to three-fifths of those stated, and monthly subscriptions at half rates will be accepted.

Hubbard's Float in Jovian Parade

The accompanying photograph shows the float of Hubbard & Company of Pittsburgh in the Jovian parade



Hubbard's Jovian Float.

in that city October 15 during the annual convention of the Sons of Jove.

Unusual Life of Dry Cells

There has recently come to our attention a case where dry cells have completely eclipsed all claims made for them by their manufacturers. In April, 1905, the Citizens' Telephone Company, of Bloomingburg, Ohio, installed a set of Columbia dry cells on one of its telephones. No trouble was ever given and the cells were entirely forgotten. Finally, however, they were replaced on August 2, 1912, after having given continuous service for over seven years, and even at that time were reported as still giving good service.

Vote on Automatic Franchise Postponed

In a long conference between Mayor Hanna, of Des Moines, Ia., and representatives of the Automatic Telephone Company, it was decided that the vote on the proposed franchise will not be held November 5th. The city contended that under the law, vote on the franchise could not be held until between November 13 and 23. The company informed Mayor Hanna that it will pay for the cost of the election. The city, however, will demand that some changes be made in the proposed franchise before affixing its official o. k.

Wisconsin Commission

In the application for improved telephone service in the village of Altoona the Wisconsin Commission has

ordered the Wisconsin Telephone Company to install the necessary additional equipment and to furnish a higher grade of service, provided a majority of the subscribers signify their intention of using such service at the higher rates ordered by the commission.

The Star Expansion Bolt Company, 147 Cedar street, New York, has just issued a pocket size booklet containing illustrations, descriptions and list prices of the various Toggles on the market. A copy of this booklet will be sent upon request.

"Some Interesting Facts About the Various Uses of Storage Batteries" is the Electric Storage Battery Company's latest piece of literature.

"Expansion Bolt Facts," a booklet, has been issued by the Van Expansion Bolt Company, Chicago.

Brevities of the Business

PERSONAL NOTES.

Milton Richard was elected president and W. B. Torrance secretary of the Guilford, Mo., Telephone Company at a recent meeting.

George D. Rushton, of Eaton Rapids, Mich., who died October 18 from typhoid fever, had been identified with the local telephone exchange since its inception thirty years ago, having been assistant manager to his father, Dr. James Rushton, who was manager of the exchange until his death two years ago, when the management passed into the hands of his son. Mr. Rushton had resided in Eaton Rapids all his life and was one of the most prominent and influential business men in the town.

William H. Eckert, well known in telegraph, telephone and railway circles, died in Stamford, Conn., October 4 at the age of 73. Colonel Eckert was a brother of the late Thomas F. Eckert, who was president of the Western Union Telegraph Company, and is the last of his generation. Deceased was a native of Ohio and started his business career as a telegraph operator at Wooster, Ohio, in 1854. He has filled many important positions in this field and was associated with the Gray National Telautograph Company, New York City, at the time of his death.

Frank Gilchrist, who has been superintendent for the Fremont Home Telephone Company for the past two years, has resigned from that company to accept a similar position with the Black River Telephone Company, with headquarters at Lorain, Ohio.

C. H. Patrick, manager of the Florida Telephone Company, Tampa, Fla., has been transferred by his company to St. Petersburg. Mr. Patrick is an efficient electrician and will be a valuable acquisition to his new post.

C. F. Rood now heads the Citizens' Telephone Company at Grand Rapids, Mich. R. D. Graham is the new vice-president, E. B. Fisher secretary, and W. J. Stuart treasurer. C. E. Tarte was reappointed general manager, his services being commended by the board of directors of the company.

Martin H. Murphy has been discharged, at his own request, as receiver of the York State Telephone Company. An order granted by Justice Horton was filed in the Chemung County Clerk's office at Elmira, N. Y. Mr. Murphy will remain as general manager of the company. Walter W. Nicholson was appointed to succeed Mr. Murphy as receiver and has filed a bond of $50,000.

W. Rush of Ravenden Springs has been elected president of the Farmers' Mutual Telephone Company at Little Rock, Ark. Rufe Lacy of Foster was named vice-president, Joseph DeClerk of Pocahontas secretary, and L. C. Haynes, also a Pocahontas man, treasurer.

S. B. French, Jr., of Menominee, Mich., who is an attache of the signal corps of the United States army, has charge of the construction of a long distance telephone line to the San Ramon prison farm, which is twenty-five miles southwest of Zamboango. He has sixty hombres cutting a trail through bamboo and cocoanut groves, the work being done with bolos.

J. C. Owens, district manager of the Rocky Mountain Telephone Company of Cody, Wyo., and C. R. Northrup, the local manager, announced as the result of an official visit to Meeteetse and Burlington that many improvements in the telephone system will be made at those two points.

W. W. Ryder has assumed the newly created position of manager of the railway department of the Western Union Telegraph Company, New York. He has a wide knowledge of railroad telegraph and telephone affairs and previous to his acceptance of his new office was general superintendent of telegraph of the New York Central lines west of Buffalo, with headquarters in Chicago.

E. H. Lawson, who has held an official position with the Southwestern Telephone Company at Houston, Texas, for the last two years, has been transferred to Dallas.

C. N. Woods, forest supervisor of Idaho, conducted the work of the South Boise River telephone construction which has been completed recently. A line was built from Soldier Summit to the head of the South Boise and one down Big Smoky to Shade Creek.

J. C. Casler and Clarence Linz, of the Automatic Telephone Company of Dallas, Texas, had as recent guests a party of St. Louis capitalists who represent other investments in Dallas and who came to the city for the purpose of looking over the telephone property.

Gansey R. Johnston, manager of the Citizens' Telephone Company at Columbus, Ohio, entertained a number of telephone and electric men recently at a luncheon at the Ohio Club. His guests were in Columbus on telephone construction business and the party comprised: H. D. Stroud, M. Schwartz, F. Kessler and F. Nefrouch of Chicago and J. M. Broush, Roy Owens and President Samuel G. McMeen of the Columbus Railway and Light Company.

George C. French of Milwaukee, district commercial manager for the Wisconsin Telephone Company, made a recent thorough inspection of the work at Racine, which has been in progress on the telephone lines and exchange for the last year.

J. C. Symmes, division superintendent; J. B. Ball, division traffic supervisor, and W. F. Armstrong, chief clerk in the plant department, all of Nashville, Tenn., and F. A. Webster, of Atlanta, were in Paducah recently looking after the interests of the Cumberland Telephone and Telegraph Company, with a view to enlarging the plant.

H. D. McVey, formerly manager of the local offices of the Mountain States Telephone and Telegraph Company, at Tucson, Ariz., is now in Phoenix working on the consolidation of his company with the Overland Telephone Company. The Overland Telephone Company is the automatic.

W. J. O'Hea, of Buffalo, has assumed the duties of district manager of the New York Telephone Company in Rochester, succeeding William G. Barry, transferred to St. Louis, the change being regarded as a promotion. Mr. O'Hea served for three years as assistant manager of the Buffalo district, and has been in the employ of the company fifteen years.

Sam Caldwell, assistant secretary for the Cumberland Telephone and Telegraph Company in its Nashville, Tenn., offices, has been placed in charge of the Savannah offices.

Forest Ranger Poe, of Fort Worth, Texas, has a crew at work constructing a telephone line from Hill City to the Lookout station on top of Harney Peak. When completed, this line will give Ranger Poe direct communication with headquarters of the Harney National Forest at Custer. The telephone is of inestimable value in mobilizing men for forest fires.

George Annan, who for the last five years has been stationed at Sterling, Ill., as the manager for the Inter-State Independent Telephone Company, has been given charge of the company's business at Springfield. He succeeds C. D. Judd, who has been transferred to the company's general offices at Aurora.

H. T. Gardner, of the electrical engineering department of the Cumberland Telephone and Telegraph Company at Nashville, Tenn., has gone into business as an architect, being junior member of the firm of Hart & Gardner.

W. J. Hiss, who has been in charge of the New York Telephone Company of Western New York, with headquarters at Buffalo, for a number of years, leaves to assume the general

managership of the Bell Telephone Company of Missouri, the chief executive offices of which are at St. Louis.

A. M. Winters, of Alpena, S. D., has purchased the local telephone exchange, to which he will give his personal attention.

W. M. Eason was retained as president and M. Snowball as secretary of the newly merged Home Telephone Company of Pasadena and the Pacific Telephone Company. The new board of directors includes H. M. Robinson, vice-president; H. F. Anderson, Robert Pitcairn, Jr., John G. Mott, W. H. Vedder, together with Eason and Snowball.

K. Ward Smith, assistant auditor at the Nashville offices of the Cumberland Telephone and Telegraph Company, has been given a promotion in the way of a new position at the Atlanta office.

C. Arthur Spaulding, formerly of Rochester, N. Y., has been appointed successor to the present division general manager of the New York Telephone Company, at Buffalo.

S. L. Gilman, general manager of the Missouri and Kansas Telephone Company at Leavenworth, has resigned to accept a position with the Western Electric Company.

H. R. Gabay, who for over two years has been division commercial engineer of the New York Telephone Company, with headquarters in Syracuse, has left for New York to become plant engineer for the company's Manhattan and Western division. Officials of the company tendered him a farewell dinner at the Onondaga. E. M. Gladden succeeds Mr. Gabay as division commercial engineer.

Onei Shurtz has resigned his position with the Boone County Telephone Company as cashier and accepted a position as traveling auditor for the Bell Telephone Company. His headquarters will be in Omaha. His territory will include Iowa, Nebraska, North Dakota, South Dakota, Minnesota and a portion of Michigan. Harry Pulver, who has been with the company a number of years, will take the position vacated by Mr. Shurtz.

Ben S. Read will assume his duties as general manager of the Missouri and Kansas Telephone Company November 1 at Topeka, Kas. Mr. Read has been connected with the Cumberland Telephone and Telegraph Company in a responsible position for twenty-two years. For the past year he has been the general manager of the Bell Telephone Company of Missouri, operating in Eastern Missouri and Arkansas.

Fred W. Longam and W. K. Maxwell have been elected to succeed Judge T. M. Harris as director of the Central Illinois Telephone and Telegraph Company at Bloomington, Ill. E. D. Blinn, Jr., was made assistant superintendent and will work with Manager Biwer until the first of the year, when Mr. Biwer retires and Mr. Blinn takes over the management.

C. E. Rollin, manager of the Seminole Telephone Company of Texas, has furnished a drawing showing the lines of that company, which now cover the following counties in the South Plains country: Gaines, Dawson, Yoakum, Andrews, Midland, in Texas, and Chavis county, N. M.

J. D. Milburn, Texas representative for the Stromberg-Carlson Telephone Manufacturing Company, states that there is a general revival of business throughout the section which he has recently visited and that future prospects for Independent telephony are brighter than they have ever been before.

O. H. Harben, owner and manager of the Lewisville telephone exchange, is improving his plant. Mr. Harben was formerly at Richardson, Texas, but left that exchange the first of the year and purchased the exchange at Lewisville. He is building toll lines to Bartonville and Hebron and is making arrangements to install a lead of cable and make other extensions to his exchange.

J. T. Knode, division manager for the Cumberland Valley Telephone Company, with headquarters at Martinsburg, W. Va., has closed a contract for interchange of business with the Inwood Rural Telephone Company, of Inwood, W. Va. The latter company has some seventy-five subscribers, which it expects to increase to upwards of 100 by the first of the year. In making this contract with the Cumberland Valley, the Inwood company severed similar relations with the Chesapeake and Potomac Bell.

H. O. Blackwell, former superintendent of the Nashville shops of the Cumberland Telephone and Telegraph Company, has entered the vulcanizing business in Nashville.

W. F. Lange, auditor of the Dakota Central Telephone Company, has been honored with the appointment of city assessor and deputy city auditor by the city commissioners of Aberdeen, S. D.

E. P. Ingram, who has been district manager for the Southwestern Telegraph and Telephone Company in Pine Bluff, Ark., for several years, has been transferred to Little Rock, where he will have charge of all the local business. He is succeeded by W. L. Jones, who has been connected with the Little Rock exchange for some time.

E. E. Michael, who for the past three years has been manager of the Tecumseh exchange of a telephone company, is arranging to give up the work and go to Brainerd, Minn., where he will enter the electrical supply business.

George L. Pavy, of Missoula, Mont., district manager of the Mountain States Telephone and Telegraph Company, spent some time in Polson recently arranging the preliminaries for the construction of a telephone line from Missoula to Polson.

F. G. Snyder has bought the Kamrar Telephone Company outfit, the poles, wire, telephones and exchange, and he and A. B. Hall have taken the equipment down and shipped it to Jewell, Iowa. The company was a local one, doing business only in town at Kamrar, connecting up with other lines in the country and with other towns. The connections hereafter will be made through the Independent line.

R. J. Selkirk, of Tombstone, Ariz., supervisor of the Coronado national forest, is considering the feasibility of constructing a telephone line from Canille to Ft. Huachuca, and from that point to connect with Huachuca ranger station. The total distance is estimated at twenty-five miles.

Albert Unger died September 29 at the Toledo State Hospital, where he had been a patient for some time. Mr. Unger was formerly manager of the Bucyrus Telephone Company, Bucyrus, Ohio.

Hammond V. Hayes, consulting engineer, Boston, Mass., is acting on behalf of the National Telephone Company in the appraisal investigation of that company's properties, which were taken over by the British Postoffice Department last January.

Benjamin S. Reed, who was elected general manager of the Bell Telephone Company of Missouri following the reorganization of the company last March, has been chosen general manager of the Missouri and Kansas Telephone Company, with headquarters in Kansas City.

Edward G. Dunkel, expert electrician and chief apparatus installer for the Home Telephone Company, Dayton, Ohio, was almost instantly killed when an automobile, which he was driving, crashed into a heavy pole on October 5. Interment was at Cincinnati.

Gerald Deakin, formerly chief engineer of the Bay Cities Home Telephone Company and recently automatic plant engineer of the Pacific Telephone and Telegraph Company, has left for New York on his way to Europe to take up the development of automatic telephone apparatus for the Bell Telephone Manufacturing Company of Antwerp. Mr. and Mrs. Deakin expect to reside in Europe for the next three to five years.

A. R. Bone has been appointed commercial superintendent of the Chicago city division, Chicago Telephone Company, succeeding A. M. Ramsay, who has been directory superintendent. The present directory division of the Chicago commercial department and the directory work of the suburban division are transferred to his division. He will report to the general commercial superintendent.

Louis H. Terrill, for the past two years chief clerk of the New York Telephone Company in Corning, N. Y., has been promoted to a position in the company's commercial department in Elmira.

A. G. Francis, subscriber's agent for railroads and transportation, with the Chicago Telephone Company, has had his territory extended to include all of the state of Illinois.

W. W. Dean has disposed of his interests in the Dean Electric Company of Elyria, Ohio, and has resigned from the directorate of the company. He now is forming a new company for the manufacture of a general line of electrical appliances.

George A. Gilfillan, acting general manager and consulting engineer of the Morris County Traction Company, Morristown, N. J., has resigned with that company to accept a similar position with the Black River Telephone Company, with headquarters at Lorain, Ohio.

B. A. Pratt, press agent in the suburban division, Chicago Telephone Company, has been transferred to the publicity department of the five companies of the Central Group, reporting to Clifford Arrick.

J. R. Ruddick, formerly chief clerk to the division auditor of receipts at Chicago, has been appointed division auditor of receipts at Indianapolis, succeeding M. Quinlan, who resigned to accept a position with the Western Union Telegraph Company in New York.

Philip L. Spalding, of Philadelphia, Pa., was elected president of the New England Telephone and Telegraph Company at a meeting of the board of directors of that company, held in Boston recently. He succeeds Jasper N. Keller. Mr. Spalding

has been closely identified with the Bell system in the states of Pennsylvania, New Jersey and Delaware for the last eighteen years, and since 1910 has held the position of second vice-president and general manager of the Bell Telephone Company of Pennsylvania, the Central District and Printing Telegraph Company, the Delaware and Atlantic Telegraph and Telephone Company, and the Diamond State Telephone Company. He was born in 1871 in Connecticut and in 1892 was graduated from Harvard. He first entered the telephone business in July, 1894, in the mechanical department of the American Telephone and Telegraph Company of Boston.

E. M. Vernon, who for some time was employed by the Western Union Telegraph and Telephone Company, has been transferred to Childress, Texas, where he has taken charge. A. L. Burns, of Dallas, has succeeded Mr. Vernon as manager of the Orange office.

J. G. Emery, Jr., William Munroe, City Treasurer John H. Moore, William H. Mann and Thomas Hume, Muskegon men, former directors of the Citizens' Telephone Company, were named as directors on the board of the company just formed by the merging of the Citizens' Telephone Company of Muskegon and the United Home Telephone Company of Ludington.

F. T. Proctor has been placed at the head of the auditing department of the Nashville, Tenn., division of the Cumberland Telephone and Telegraph Company.

After twenty-seven years of service with the New England Telephone and Telegraph Company, Jasper N. Keller has announced his resignation as president. It was accepted with regret by the directors, and with assurance of hearty appreciation of his valuable services as general manager, vice-president and president. Mr. Keller's withdrawal was based on a feeling that after more than fifty years of hard work, the greater part of it in telegraph and telephone development, he owed himself the luxury of some leisure. He came to the New England company in 1884 as general manager, after a successful experience in telephony in the far West and in Texas. He will not entirely sever his connection with the New England company, however. At the request of the directors he has agreed to serve in an advisory capacity and to remain on the board of directors.

Fred Latta has been promoted from the position of manager to that of district manager of the Columbia and Mt. Pleasant offices of the Cumberland Telephone Company. Ira E. Travis is district plant chief. Mr. Latta still has charge of the Maury county exchanges and while he is away from home, about three-fourths of the time, his assistant, C. A. Latham, has charge during his absence.

J. E. Hill, of Huntington, Tenn., has succeeded Homer Jolly as manager of the Cumberland Telephone Company in Hickman.

Edward K. Hall, one of the attorneys of the New England Telephone and Telegraph Company, has been elected a vice-president, for such duties as he may be assigned by the president. John Balch, formerly treasurer of the Western Telephone Company, was elected assistant treasurer.

Capt. W. M. Denton, who for the last four years has been the joint owner with Z. W. Kirkland of the telephone exchange at Vidalia, has bought the local telephone exchange at Soperton, Ga. Capt. Denton was in Atlanta recently to consummate the sale of the Vidalia exchange to the Southern Bell Telegraph and Telephone Company, and upon his return took hold of the local exchange. He will put in new fixtures, double wire all the lines and give good long distance connections. He will also run several lines out into the surrounding country, which will not only put the farmer in touch with the cotton market, but with the corn, hay and potato market as well.

E. J. Marshall, Toledo banker, who is president of the Inter-State Telephone and Telegraph Company of Illinois, broke a bone in his ankle recently while on a fishing trip with a party of friends.

Ben S. Read, formerly connected with the Cumberland Telegraph and Telephone Company, will be the new general manager of the Missouri and Kansas Bell Company at St. Joseph, Mo. He will take up his work November 1.

K. Perrin, Mr. Campbell and Mr. Thorgrimson, representing the Lincoln Telephone Company, were in Beaver, Neb., recently, and while there made several changes; Ed Moore was made local manager and Miss Selma Hansen was hired as assistant.

Miss Mary Agnes McKew, the oldest operator in point of service of the Chesapeake and Potomac Telephone Company, died at her home, 2 East Hill street, Baltimore, Md., October 9. Her death was due, according to her physicians, to a nervous breakdown.

D. H. Morris, of Dayton, connected with the Ohio state engineer's department of the Central Union Telephone Company, has been appointed to the position of district commercial manager of the Columbus district, with headquarters at Columbus, Ohio. He succeeds J. F. Drukemiller, who has been transferred to the position of district commercial manager of the second or Chillicothe district, with Columbus headquarters, succeeding N. G. Warth, who has resigned.

Fred Perkins has been appointed receiver for the Citizens' Home Telephone Company, which operates telephones at Parsons, Pittsburgh, Oswego, Chetopa, Mound Valley, Altamont, Bartlett and Edna, and has about 200 miles of lines and about 3,500 subscribers. The suit is a friendly one to shape the affairs of the company for reorganization.

B. T. Calaway, manager of the Central Union Telephone Company at Akron, has been transferred to Columbus in the position of chief clerk to the commercial superintendent, succeeding W. R. Nutt, who has been transferred to the position of division cashier. C. P. Bradford, special agent to the agent for connecting companies, has been transferred to Akron and placed in the position of manager of the exchange there.

T. H. Lemire has succeeded R. J. Barnes as manager for the Michigan State Telephone Company at White Cloud, Mich.

L. M. Condit died in a Salt Lake City hospital early in October, following an operation for gall stones. The remains were taken to Albion, where the funeral was held. Mr. Condit was one of the pioneers of Utah, having come to Cassia county in 1888. He lived there ever since. He was actively engaged in helping develop the resources of that county, having been engaged in the mercantile business, besides owning a large ranch at Malta, his former home. A few years ago he sold his interest at Malta and moved to Albion. He was a member of the county commissioners. He was 62 years old and was born in the state of Iowa.

N. T. Guernsey, who soon is to leave Des Moines to become attorney in New York for the American Telephone and Telegraph Company, was the guest of honor at a dinner given at the Des Moines Club by his partners, A. C. Parker and W. E. Miller. Fifty members of the Des Moines bar and intimate friends of Mr. Guernsey attended the party.

Brown and Williams, well known in the practice of patent and trade-mark law, with offices at 1550 Monadnock block, Chicago, have added Albert C. Bell, Harvey L. Hanson and Arthur H. Boettcher to the firm, which is now named as that of Brown, Williams, Bell, Hanson and Boettcher. The new partners have been actively associated with the firm for years.

NEW TELEPHONE COMPANIES.

AUGUSTA, N. Y.—Automatic Telephone Company, Augusta, to carry on a telephone business; capital, $1,000,000.

BERKEY, O.—Berkey Farmers' Mutual Telephone Company, Berkey, not for profit; R. Murbar and others.

BRANDON, VA.—Brandon Telephone Exchange, Brandon, Va. Capital: Maximum, $5,000; minimum, $1,000. J. T. Deal, president, Norfolk; H. C. Harrison, Savannah, Ga.; F. Otway Byrd, secretary and treasurer, Brandon, Va.

CAMBRIDGE, ILL.—Citizens' Mutual Telephone Company of Cambridge, Ill.; capital stock increased from $2,250 to $4,750.

CARLINVILLE, ILL.—The Macoupin County Telephone Company, with a capital stock of $5,000, has been incorporated by George B. Carey, Thomas A. Cheadle and C. B. Cheadle. As stated in the charter, the purpose of the company is to acquire, construct, rebuild, develop, operate, maintain, sell and dispose of all telephone and telegraph lines, exchanges and systems in the county. The principal office is to be in Carlinville. The shares of stock are worth $100 each. Of these C. B. Cheadle owns forty-eight shares, Thomas A. Cheadle one share and George B. Carey one share.

CERRO GORDO, ILL.—The Piatt County Mutual Telephone Company, Cerro Gordo; capital, $10,000; maintain and operate a telephone system; Frank Etnoyer, Robert Blood, John C. Wine, Frank Wolfe, George Fulk, incorporators.

CLOUDCROFT, N. M.—Several farmers living in Cox canyon and the merchants in Cloudcroft have joined together and are now constructing a system of farm line telephones out of Cloudcroft and down Cox canyon.

COLCHESTER, ILL.—Colchester Farmers' Telephone Company, Colchester, $6,000; operate telephone lines; Frank Stump, James M. Clayton, Louis A. Hull.

COLUMBIA, S. C.—The Campobello Telephone Company has been chartered with a capital stock of $1,000. The officers are N. T. Clark, president, and T. B. Gibson, secretary and treasurer.

AUGUSTA, ME.—The Automatic Telephone Company of Au-

gusta, Me., filed articles of incorporation with W. C. Hayword, secretary of state. The authorized capital stock of the company is $1,000,000. There are to be 100,000 shares, 20,000 common shares and 80,000 preferred shares.

DES MOINES, IA.—With $1,000,000 capital the Automatic Telephone Company, organized to install an automatic telephone exchange in Des Moines, has been incorporated. L. W. Stanton of Davenport and O. C. Schultz of Madison, Wis., are promoters of the company.

DEWAR, OKLA.—The Dewar Telephone Company; capital, $3,000; incorporators, W. C. Brymer, J. W. Fowler, F. M. Pearson.

THAYER, IA.—A telephone company has been organized in Union and Clarke counties, with headquarters at Thayer, Union county. The capital stock is $1,300, with fifty-two stockholders. The officers of the company are Wiley Gripp, president; Oscar Gripp, secretary, and J. A. Jackson, treasurer, and John Laufer, Joseph McClure and C. W. Patterson, directors.

JACKSONVILLE, FLA.—The Home Telephone Company of Jacksonville, Fla., has been incorporated with $1,325,000 capital stock and has plans for operating a 1,000-mile telephone system.

LUCIEN, OKLA.—The Lucien Telephone Company, Lucien; capital, $10,000; incorporators, J. W. Oliver, O. S. Alloway, S. H. Gaines, A. W. Wolleson and J. L. Kirkhart, all of Lucien.

MOORES HILL, IND.—The Chesterville and Moores Hill Telephone Company, Moores Hill; $180; to operate telephone lines; W. A. Wheeler, B. Marshall, J. Loftus.

NASHVILLE, TENN.—Martin Rural Telephone Company, Weakley county; capital, $5,000; incorporators, J. Y. Bowers, R. Bell, H. P. Bell, O. D. Collier, J. T. Parrish.

RUSHVILLE, ILL.—A new telephone company has filed incorporation papers and claim they are going to install a new switch board in Rushville. Capital stock is $10,000, of which C. L. DeWitt takes $3,940 and J. E. Peck $2,510, making a total to Messrs. DeWitt and Peck of $6,450, giving to them full control of the proposed new company. Other stockholders of the Grange company take nearly all of the balance of the stock.

WATOVA, OKLA.—Watova Telephone Company, Watova; capital, $2,000; directors, W. A. Munson, W. J. Taylor and A. D. Young, all of Watova.

WYMORE, NEB.—The Wymore Independent Telephone Company has been organized at Wymore in opposition to the Lincoln Telegraph and Telephone Company. The officers are: J. A. Reuling, president; Sherman Taylor, vice-president; F. E. Crawford, secretary; M. J. Moran, treasurer. The directors comprise the officers with Dr. C. G. Gafford, James Shields, Dan Delehant, H. Lacey and George Gerdes. The company is capitalized for $25,000.

FINANCIAL ITEMS.

MARSHALLTOWN, IA.—The directors of the Mutual Telephone Company have declared a semi-annual dividend of 5 per cent on the common stock which amounted to $1,135.

BOSTON, MASS.—The Mexican Telephone and Telegraph Company declared regular semi-annual dividend of 2½ per cent on the preferred stock, payable November 1 to stock of record October 14.

BOSTON, MASS.—It is understood that the New England Telephone Company bonds have actually been allotted to more investors than the total number of stockholders in the company. There is $42,000,000 stock, which means that the bonds are more than five times as well distributed as the stock, which is a distinctive Massachusetts tax-exempt security. The average distribution of the bonds was much under five bonds per investor. Allotment letters have been sent out. Those who subscribed for one and two bonds get the full amount. Subscribers for ten bonds get only two. All other subscribers receive less than the full amount for which they applied. The New England Company $10,000,000 bond issue is the largest lot of bonds of a distinctly local enterprise ever offered in Boston. The success of the flotation is also one of the most conspicuous.

CAPE CHARLES, VA.—A deed has been filed for record in the office of the clerk of the court by which all the property of the Diamond State Telephone Company, located on the Eastern Shore, is transferred to the Chesapeake and Potomac Telephone Company of Baltimore city. The consideration named is $515,580.88, and the assumption of a mortgage of $500,000.

CHICAGO, ILL.—New England Telephone and Telegraph Company has sold to Kidder, Peabody & Co. $10,000,000 twenty-year debenture 5 per cent bonds.

CHICAGO, ILL.—The only remaining financing of any moment which the Bell system is likely to do this year is the possible sale by one of the subsidiaries of a block of between $5,000,000 and $10,000,000 bonds. Although the matter is undecided, it is likely that if anything of this nature does take place, the Southwestern Telephone Company will be the financing medium chosen. The present Bell policy is to keep the system strong in cash and absolutely free from all outside floating debt. This policy and continued absorption of small independent telephone companies at various points throughout the country are taking a good deal of ready money, but so far as independent telephone buying is concerned, it is now at a point where another year or two will see its end.

CHIPPEWA FALLS, WIS.—At a stockholders' meeting of the Chippewa County Telephone Company the capital stock of $30,000 was raised to $150,000. The proposition of enlarging the exchange at Eau Claire was discussed. Many of the stockholders are in favor of installing the automatic telephone system both in this city and Eau Claire.

LUDINGTON, MICH.—The United Home Telephone Company, Ludington, increased from $300,000 to $500,000.

LINCOLN, NEB.—The annual report of the telephone company shows net earnings of a little over 5 per cent a year on the value of the plant, after deducting 2 per cent for depreciation. The president of the company says that the depreciation reserve ought to be three times that amount, and that the insufficient returns will make an increase in rates at an early day necessary.

MOLINE, ILL.—The Citizens' Telephone Company sent out checks in payment of its regular quarterly dividend, amounting to practically $80,000.

MONTGOMERY, ALA.—Notification of a $3,000,000 bond issue was filed at the office of Judge of Probate J. B. Gaston by the Southern Bell Telephone and Telegraph Company. The Bankers' Trust Company of New York and James H. Parsons, trustee, have been assigned mortgages as security for the bonds on the property of the corporation in several states. The company has the privilege of issuing bonds to the extent of $50,000,000 and $10,000,000 bonds were issued several months ago.

PHILADELPHIA, PA.—There has been regularly listed on the Philadelphia Stock Exchange $32,700 additional American Telephone and Telegraph Company stock.

PHILADELPHIA, PA.—Six months' net earnings of the Mexican Telegraph and Telephone Company were $181,846, an increase of $27,956.

PHILADELPHIA, PA.—The Keystone Telephone Company's gross earnings in August were $101,128, compared with $96,928 in August, 1911. Net amounted to $48,524; last year the same item stood at $47,681. The net surplus was $23,049; last year, $22,608. For eight months the gross was $799,779, compared with $774,342; net, $396,409, compared with $389,112; net surplus, $195,369, compared with $193,333.

RICHMOND, VA.—Amendment to charter Southern Bell Telephone and Telegraph Company of Virginia, changing its name to the Chesapeake and Potomac Telephone Company, and increasing its capital from $6,000,000 to $10,000,000.

QUINCY, ILL.—The Home Telephone Company has paid to City Treasurer T. D. Morehead the sum of $10,000, as provided for in the recent ordinance.

FRANCHISES ASKED AND GRANTED.

FRANKFORT, KY.—For the purpose of adding the telephone service to the telegraph service the Postal Telegraph and Cable Company, of Louisville, has filed amended articles of incorporation, giving the company that privilege in Kentucky. The capital stock of $75,000 has not been increased.

STONE CHURCH, PENN.—A state charter has been issued to the Mount Bethel Telephone Company, Stone Church, Northampton county capital, $10,000.

OKLAHOMA CITY, OKLA.—A charter was granted the Pearl Valley Telephone Company, capital $1,000; incorporators, John S. Chambers, Andrew F. Thompson, Henry Thompson, George L. Wristow, Cedardale.

TACOMA, WASH.—The Sunset Telephone & Telegraph Company will make improvements to the extent of $100,000, if granted a new franchise to operate in this city.

BOSWELL, PA.—The Bell Telephone Company has been granted a franchise by the Boswell council, with the provision that the company give free service to part of Somerset county, to its subscribers in Boswell and that it adhere to certain fixed charges for residence and business telephones.

MADISON, S. D.—A local franchise has been applied for by the Franklin Telephone Company.

SANTA MARIA, CAL.—The Pacific Telephone & Telegraph Company has been granted a franchise to erect poles, wires and other conductors for transmission of electricity upon highways of Santa Maria.

WINNEMUCCA, NEV.—The Golconda Telephone and Power Company has applied for a franchise to erect poles and string

wire thereon for a new telephone line from Winnemucca to National, via Paradise Valley.

DAVENPORT, IOWA.—J. B. Voss, of Davenport, representing the Tri-City Home Automatic Telephone Company, which has recently secured franchises in Moline and Davenport, filed a petition in the office of the city clerk in which a general election is requested on a franchise ordinance in Rock Island. Permission to build and operate a telephone exchange in the city for a period of twenty-five years is sought and the promise is made that if the ordinance is passed, actual work of installation will begin within ninety days and that the plant will be in operation within eighteen months. No action on the petition will be taken for some time, but it will undoubtedly come to a vote eventually.

ST. CLOUD, MINN.—St. Coud will have a second long distance telephone company, the people having voted to admit the Tri-State Telephone and Telegraph Company, giving them the franchise to erect their poles through the streets and alleys.

DEWAR, OKLA.—A state charter has been granted the Dewar Telephone Company, of Dewar; capital stock, $3,000. Incorporators, W. G. Brymer, J. W. Fowler and F. M. Pearsons, of Dewar.

CAMPOBELLO, S. C.—Commissioned: Campobello Telephone Company, of Campobello, capital $1,000, the petitioners being J. M. Jackson, T. E. Gibson, J. B. Caldwell and N. T. Clark.

GRUNDY CENTER, IOWA.—The Grundy Center Mutual Telephone Company, of Grundy Center, Ia., is asking for a franchise and the town council has been petitioned to call a special election for this purpose. The council fixed September 30 as the date for the election, when the voters of the town pass on the franchise proposition. The telephone company has recently bought a $6,000 building and will use the second story of this building and put in an entirely new central energy system. This system will cost in the neighborhood of $15,000, and the company does not feel like making this big investment unless it can get reasonable assurance that it may continue to do business in the city. The telephone company has never before had a franchise and the one now asked covers a period of twenty years. It will not exclude any other company from going into the telephone business here.

BAY CITY, MICH.—The Valley Telephone Company offers to erect a central exchange and make other improvements to the extent of $150,000, providing the council gives it a new franchise.

BAY CITY, TEX.—A petition for a franchise for a local telephone system has been filed with the city council of Bay City, the same being signed by James W. Rugeley, J. P. Keller and E. F. McDonald, all local men. The petitioners ask for a twenty-year franchise for the purpose of operating a local and long-distance telephone system. The petition was referred to the franchise committee. The Southwestern Telephone and Telegraph Company has a system here with something like 350 telephones, and the new company has in view the establishment of a more elaborate system.

DES MOINES, IA.—Petitions for the Automatic Telephone Company franchise bearing 5,664 names were filed with Horace Susong, city clerk, by L. W. Stanton of Davenport, representing the company. If the petition is found to comply with the law, it will be the duty of the city council to pass an ordinance submitting to the people at the election November 5 the question of voting a franchise to the company.

GRUNDY CENTER, IA.—At a special election held in this city to vote upon the proposition of granting a franchise for twenty years to the Grundy County Mutual Telephone Company, the proposition carried by 21 votes.

RIALTO, CAL.—The Pacific Telephone and Telegraph Company will bid for a franchise to operate lines in this city.

SHELTON, WASH.—The Harstine Telephone Company has made application for a franchise in Mason county.

SPARKS, NEV.—The Sierra Telephone Company has asked for a franchise for a telephone system in this city.

TEKOA, WASH.—A ten-year telephone franchise has been granted to William Anderson.

VAIL, IA.—The telephone company lost out on its appeal to the supreme court in an effort to enter that town and operate without a franchise.

WYMORE, NEB.—The city council has granted a franchise to the Independent Telephone Company of Wymore. The franchise runs twenty years, gives the use of the streets and alleys for setting poles and wires. The company expects to begin work on its plant in a few days.

EVERETT, WASH.—A franchise has been granted the South Fork Telephone Company to operate a telephone line along portions of the Snohomish county roads.

LAKEPORT, CAL.—Application has been made by the Lake County Telephone Association for a franchise to construct a telephone system in the town of Lakeport. Sealed bids will be received up to November 4 for the sale of said franchise.

CONSTRUCTION.

MOLINE, ILL.—According to present estimates, the Central Union Telephone Company will place in this city 1,955 new telephones during the coming year of 1913. The instruments are now being installed at a rate of twenty-five to thirty a month, but with the additional repair force that is to be put to work the company expects to increase this rate to 200 telephones a month, with the object in view of relieving present unsatisfactory conditions as rapidly as possible.

SCHLEISINGERVILLE, WIS.—The Washington County Telephone Company contemplates erecting an electric light and power plant here.

ABERDEEN, S. D.—The Dakota Central Telephone Company announces it will expend $50,000 this fall in improving its equipment in South Dakota and southern North Dakota. Extensions will be made at Doland, Frankfort and Lake Andes, in South Dakota, and in Dantzig and Oakes, in North Dakota.

OAKES, N. D.—The Dakota Central Telephone Company is spending $10,000 in this vicinity in improvements. The work is along the line of giving better service to their many patrons.

SHERIDAN, WYO.—The Mountain States Telephone and Telegraph Company will undertake construction shortly upon a new exchange building to be erected at Sheridan and will try to have the structure, which will cost about $20,000, ready for occupancy by January 1.

BISMARK, N. D.—The Independent Telephone Company has closed a deal recently whereby it became the owner of the South Morton County Telephone Company. There will be various improvements made, as for instance, putting in a new exchange at Flasher and a toll line from Mandan to Flasher. So that Flasher will have perfect service, the system will be rebuilt and will be right up to date. There will also be a toll line built from Flasher taking in the various towns along the Milwaukee branch, these towns having had no telephone service previously.

BIRMINGHAM, ALA.—The Southern Bell Telephone and Telegraph Company will expend $25,000 on the immediate laying of a cable line to Bessemer, which will allow fifty additional lines to the eighteen already existing to that town.

CARBON COUNTY.—The new telephone line throughout Lehigh township, Laurytown and Lausanne townships, in Carbon county, built principally by farmers, is completed.

WEBSTER CITY, IOWA.—The local telephone company, in which E. H. Martin is one of the principal stockholders, has let the contract for the erection of a new exchange building to cost $15,000. All modern equipment will be installed.

LANGDON, N. D.—The Langdon Telephone Company is extending its service by the building of several rural lines.

FLAXTON, N. D.—About six miles of line is being built by the Flaxton Farmers & Merchants Telephone Company, northeast of this town.

CODY, WYO.—Operations will start in a very short time on a new telephone line up the South Fork. Andy Martin is promoting the new line. At present there are about ten parties signed up. They will use the poles of the Irma Flat Company from Cody to the Flat, and from there on will install a line of their own, reaching from there over to the Wilder ranch and thence up the river for a short distance.

PHILADELPHIA, PA.—Poles have been erected and wires are being strung from Rockport, Carbon county, to Weatherly, for a private telephone line between the two points and to connect at Weatherly with the Bell line.

LANSING, MICH.—The Michigan State Telephone Company is completing the rebuilding of its lines to the city limits on East Michigan avenue and is also improving its service to the Michigan Agricultural College. Under a new arrangement, the telephone company is putting its wires on the same poles with those of the Michigan Power and Commonwealth Power Companies.

YORK, PA.—Vare Brothers, of Philadelphia, have begun work upon their contract to construct a conduit system for the Bell Telephone Company in York.

BALTIMORE, MD.—Plans for the new telephone exchange for the Chesapeake and Potomac Telephone Company, to be built at the northwest corner of Guilford avenue and Thirty-first street, have been finished by Architects McKensie, Voorhees & Gruelin, of New York. The building will be three stories high, of ornamental brick, and stone trimmings.

SPOKANE, WASH.—The St. Mary's and International Telephone Company, a Hill railroad subsidiary corporation, is installing a line connecting Glacier National Park with Browning,

the headquarters of the Blackfoot Indian Agency. Frank Sherbourne is manager of the new company. The company has completed its line from Glacier Park station to Upper and Lower Two Medicine lakes. Cut Bank, Gunsight pass, St. Mary's and Red Eagle mountain and is rushing work on the twenty-four-mile extension from St. Mary's to Lake McDermott. From the latter point the line will be taken across the mountains to Swift Current pass. The line from St. Mary's for eight miles to the Narrows on Upper St. Mary's lake is also completed.

CASPER, WYO.—The new telephone line of the Mountain States Telephone and Telegraph Company being built from Casper to Sheridan, a distance of approximately 220 miles, has been constructed to a point thirty-two miles south of Buffalo, and will reach its destination in this city in about two months, depending upon the weather and the roads. All the material used from Kaycee to Buffalo, poles, wires, cross arms, etc., have been hauled from the railroad station at Clearmont, as far as 100 miles.

STARKWEATHER, N. D.—The Starkweather Farmers Telephone Company is building a new line southeast of town.

GRAND ISLAND, NEB.—The Nebraska Telephone Company contemplates still another extension of its lines, being about to build an eight-mile line into a new farming district east of the city.

CHEBOYGAN, MICH.—The Michigan State Telephone Company is one of the big concerns of the state which has foreseen the rapid growth which northeastern Michigan is making and the company is preparing to keep pace with this growth. At the present time it is building a new exchange at Cheboygan at an expense of about $70,000. It has completed its new exchange at Oscoda, replacing the one destroyed by fire which almost wiped out Oscoda and Au Sable a year ago and it has made appropriations of sums necessary for rebuilding its exchanges at Standish and West Branch. A new copper toll line has been built between Rose City and Mio, giving Bay City and other patrons their first direct connection with Mio. A new line has also been constructed between Au Gres and Omer and two lines built to connect Gladwin and Beaverton.

LEXINGTON, MASS.—Ground has been broken for the erection of the new central telephone exchange of the New England Telephone Company on Muzzey street, near the Old Belfry Clubhouse.

PATTERSON, COL.—Work will begin within a short time on the installation of a telephone exchange for Patterson. J. H. Evans, manager of the exchange at Newman, is promoting the work. The exchange will be connected with the Pacific Telephone and Telegraph Company's toll line.

SCOTTSBLUFF, NEB.—The Platte Valley Telephone Company has purchased three lots in Gering upon which it will erect suitable quarters for the exchange there.

ROSWELL, N. M.—Final work is being done by the Rocky Mountain States Telephone and Telegraph Company on the stringing of about two miles of cable in this city and the construction of about ninety miles of branch lines into the rural districts. This work was started in February.

DEPERE, WIS.—The Wisconsin Telephone Company's engineers are making plans for the physical consolidation of the local plants, and the work will be started as soon as these are completed.

WEBSTER CITY, IOWA.—E. H. Martin has let the contract for his new telephone building to W. J. Zitterell at $15,000. It will be completed and ready for occupancy January 1. It will be erected on Wilson avenue.

CUERO, TEX.—A number of rural telephone lines will soon be built to connect with the Cuero exchange. C. G. Smith and others will rebuild the line which Mr. Smith recently bought. Another line will come in from the Lindenau community.

CALDWELL, TEX.—The telephone system here has been greatly improved by J. L. Giddings, the proprietor and manager. He had installed a new switchboard, and put in a solid mile of cable along the streets.

MARQUETTE, MICH.—The Lake Superior & Ishpeming Railway Company has completed a private telephone line from its offices here to Ishpeming. The line was built to save the time lost in making connections in the ordinary way through the telephone exchanges, and it will be a great convenience to the officials and employes of the company. In addition to its use communication between the different departments of the company, the line will be used to some extent in the train dispatcher's department.

ARLINGTON, WASH.—The South Fork Telephone Company has been organized and will build a rural line to serve that valley.

MARSHALLTOWN, IA.—The Interior Telephone Company has given the contract for a new building on the Dr. C. E. Harris property, to Philip Streck, and it is to be completed by January 1, next. The building is to be 25x10 feet in dimensions and will be attractive and convenient. It is on the corner of Broad and Fifth avenue.

DOUGLAS, ARIZ.—The telephone system of this city is being reconstructed. A carload of poles and a carload of conduit piping are being placed and new telephone instruments have been distributed all over the city. The new exchange building is nearly completed.

NEW PRAGUE, MINN.—The New Prague Telephone Company will build twenty-miles of new lines and branches this fall.

PORTLAND, ORE.—One of the largest buildings to be erected here will be the fourteen-story home for the Pacific Telephone and Telegraph Company. The structure will be built at the southeast corner of Oak and Park streets and will cost about $750,000.

ST. MARIES, WASH.—The Interstate Telephone Company has purchased part of lot 9, block 7, and will erect a $9,000 structure for a telephone exchange.

CANTON, ILL.—Some of the stockholders of the Cuba Northwestern Telephone Company have built a new line from Will Cameron's to Cuba. The new line has been called the "Farmers Friend."

LA SALLE, ILL.—The Central Union Telephone Company, one of the branches of the American Bell, has started the use of concrete poles for its long-distance service, and will install them at La Salle.

COLUMBIA CITY, IND.—The Farmers' Mutual Telephone Company, of this city, who operate practically exclusively in Whitely county, are making some extensive improvements at South Whitely, where they are taking down all of their wires and putting the same underground, and when the work is completed the company will have something like 8,000 feet of cable underground. In addition to this they are making preparations to change their office. New and complete switchboard will be installed and this will give South Whitely one of the most complete exchanges in the country.

CHARLOTTE, N. C.—The Western Union has effected arrangements with the Southern Bell Telephone Company whereby it will have the use of certain sections of underground conduits in which it will place all of its wires in the business sections of the city. The work of removing the heavy cables from the poles will begin about the first of the year and it is hoped to have the job complete within the course of a few months.

REDLANDS, CAL.—Workmen have completed the construction of a new telephone line from Redlands to the Pine Knot Hotel in Bear Valley, the line being built by the hotel company. It is a private venture and will be operated for the convenience of persons patronizing the valley resort. A crew of men has been at work on the line since early in the spring and the line has been constructed over a route that required much work in territory probably never before visited by man.

LEWISTOWN, MONT.—The Mountain States Telephone Company has begun excavating for the erection of a handsome three-story building to be erected on Fourth avenue adjoining the First National Bank. The structure will cost $30,000.

ABERDEEN, S. D.—Coincident with the opening of the new telephone building, which cost $50,000, the new passenger station of the railroads entering this city, which cost $40,000, was opened. The new telephone building is three stories and is equipped for the future growth of Aberdeen.

ALEXANDER, ILL.—The Bell Telephone Company has installed a new switchboard in the exchange at Alexander which is proving a great improvement in traffic through that point.

ALLEGHANY (SIERRA CO.), CAL.—The construction crew of the forest service is rushing work on the new telephone line to traverse Sierra county, and temporary headquarters have been established at the Miller ranch station near Mountain House. The main line is to be twenty miles long, extending from North Bloomfield to Camptonville. Telephones are being installed at various ranches and mines and the new line will give protection over a heavily forested country in north central Nevada and southwestern Sierra counties. Other lines are being projected in this section.

AUBURN, N. Y.—Extensive alterations are being made in the switchboards of the New York Telephone Company at its Clark street offices to make provision for the taking over of the Federal Telephone Company's automatic system. The switchboards will be enlarged so that six and perhaps more operators can be added to the present staff.

BALTIMORE, MD.—A three-story telephone exchange, to cost not less than $48,000, will be erected by the Chesapeake and Potomac Telephone Company at the northwest corner of Guilford avenue and Thirty-first street. Plans for the building have been submitted to the Building Inspector, who granted permission

for the work to begin. The lot on which the building will be erected is 152 feet 6 inches by 50 feet, while the building itself will be 76 feet 8 inches by 50 feet. It will be of brick, with terra cotta cornices and trimmings. The roof will be of slag.

BARABOO, WIS.—The work on the new $30,000 telephone plant has been started. It is expected the building will be ready next spring.

BAY CITY, MICH.—The Michigan State Telephone Company will soon commence the construction of additional toll lines between this city and Standish and Tawas City. Two new copper lines are to be run to Standish and one new line from there to Tawas, while a second one will be run from the vicinity of Au Gres to Tawas. The cost of the improvement will be about $12,500.

BEATRICE, NEB.—The work of laying the conduits for the underground cables of the Lincoln Telephone and Telegraph Company is progressing rapidly. The company expects to be connected up with its new telephone plant on North Sixth street by January 1.

BOONVILLE, N. Y.—The Mutual Telephone Company is at work installing its lines throughout the village and will soon have the switchboard in place in their office in the Dr. Bartlett Block. The work is being done under the direction of Mr. Niles of Utica and the company expects to be in working order by December 1.

CANTON, ILL.—Extensive improvements in the local lines of the Central Union Telephone Company have been made. The entire contract will represent an expenditure of about $45,000.

CANUTILLO, MEX.—The Tri-State Telephone Company has started work on its new line from El Paso to Denver, Mr. Riely is in charge of the construction camp at Canutillo.

CARLOCK, ILL.—The entire telephone system in Carlock is being rebuilt. Fine new substantial poles with heavy arms with plenty of wire room are being set all through town and when everything is finished we will be ready for winter and will have good service, despite the sleet and storms.

CARLINVILLE, ILL.—The Macoupin County Telephone Company, which recently purchased the telephone systems in Carlinville, has bought a lot on First North street. The purchase was made from L. P. Daley and the new telephone company will erect a two-story brick office building on the site.

CINCINNATI, O.—The new Warsaw telephone exchange had a recent formal opening. The new building faces on Warsaw avenue, Price Hill, and is a fine specimen of the Italian renaissance style of architecture. It was planned and supervised by Architect Harry Blake at a cost of $50,360, of which $9,000 was paid for the site.

CONCRETE, WASH.—The Skagit River Telephone Company has decided to extend its line to Marblemount from Rockport, a distance of ten miles. William Jennings is president of the company.

CROCKETT, TEXAS.—J. C. Cook, proprietor of the Crockett Telephone Exchange, has a force of men at work on the lines in this city, putting in new lines, laying new cables and putting in new poles. The entire system will be new when this work is completed. The improvements contemplated will cost at least $15,000 and will furnish Crockett with as modern an exchange as any city its size in Texas.

ELGIN, ILL.—The Inter-State Telephone Company has moved its office into the Brey Building. The cables carrying many more wires than were in the old office were connected to the new boards and the company officials claim they are going to spend $7,000 here in rebuilding their lines and extending wires for new telephones.

EPHRATA, WASH.—The Grant Realty Company of Neppel will extend its telephone lines to Ephrata to connect with the Pacific States line, as citizens have raised the necessary bonus.

FAIRMONT, MINN.—Improvements and repairs are being made by the Fairmont Telephone Company in this locality.

FAIRFIELD, IA.—The Mt. Pleasant Telephone Company is erecting a home. It will be a two-story and basement building, 22x45.

FLASHER, S. D.—At Flasher the Independent Telephone Company has bought the South Morton County Telephone Company and will install a new exchange. A toll line will be built from Flasher to Mandan.

FONTANA, CAL.—The work of constructing a Pacific Telephone and Telegraph system in Fontana has been completed and the phones are now in use.

FRESNO, CAL.—Several thousand dollars will be spent by the telephone company in improving the service in this city, according to a statement made by Maynard Bailey, district commercial superintendent. Work will be started shortly on doubling the capacity of the underground cables throughout the city. Though not all of the appropriation for improvements has been made by the San Francisco officials, It is stated that about $25,000 will be used to improve the service here.

FORT WAYNE, IND.—The Home Telephone and Telegraph Company has let contracts for the extension of the main exchange switchboard on account of the increasing number of subscribers. The company has been obliged also to build extensive additions to its branch of the switchboard at Masterson avenue and Calhoun street.

GRAND FORKS, N. D.—The Tri-State Telephone Company is planning on improvements which will be made in the system in this city within the next three months at a cost of between $12,000 and $15,000. When the work as planned is completed Grand Forks will be the center of a system of lines running in several directions.

GRAND RAPIDS, MICH.—President Sunny of the Michigan State Telephone Company has approved estimates for the expenditure of $25,000 in general repairs to the toll lines between Holly and Grand Rapids, over which line business between Detroit and Grand Rapids is handled, the business between Detroit and Owosso and all business from Flint to Grand Rapids and points west.

GREENVILLE, TEXAS.—The Union Telephone Company of McKinney connected its heavy copper toll lines with the wires of the Home Telephone Company of Greenville, thus giving this city connection with Dallas over Independent wires and those of the Automatic Telephone Company of this city. The connection of the two lines also places Greenville in direct communication with practically every important city in North Texas as well as dozens of small towns.

GRINNELL, IA.—The Interior Telephone Company of this city has begun the excavation on the former Dr. Harris property on Fifth avenue for the new building, into which the company proposes to move its switchboards and other apparatus as soon as it is completed, for more room and the convenience of the ground floor.

GROVELAND, FLA.—The foundation has been laid for a new telephone exchange. While Groveland has direct telephone connection with the outer world, it needs a larger exchange, hence it is being built.

HILLVIEW, ILL.—The Illinois Telephone Company is spending several hundred dollars in Hillview, improving its exchange and stringing about $800 worth of cable.

HORNELL, N. Y.—The Erie Railroad has completed plans to commence the work of rewiring the Susquehanna division from Hornell to Susquehanna and of installing telephones with which to direct the movement of all trains over the division. The cost of the improvement will be $45,000, and the work must be completed within thirty days.

HUTCHINSON, MINN.—The Hutchinson Telephone Company is placing over 1,500 feet of its telephone line underground.

IRON MOUNTAIN, MONT.—Work is progressing under the supervision of Ranger Barringer on the government telephone line which starts here and extends via Cedar Creek to the Clearwater meadows.

MILLEDGEVILLE, GA.—The Milledgeville Telephone Company has moved into its own new two-story exchange building, which has been completed. A new switchboard, costing $15,000, with equipment, has been installed and the most modern service enjoyed by any city in the state will be had here.

IRONWOOD, MICH.—The telephone poles are to disappear from Suffolk street, Aurora street and McLeod avenue and a central energy system with modern switchboards will be installed. President B. E. Sunny of the Michigan State Telephone Company has authorized the expenditure of about $50,000 in additions to the plant, which will permit the exchange to develop, in keeping with the development of the town.

JACKSON, MISS.—The sum of $75,000 is an exceedingly low estimate of the amount spent by the Cumberland Telegraph and Telephone Company in bettering its local service in Jackson during the past year.

KALAMAZOO, MICH.—An expenditure of between $10,000 and $15,000 is contemplated by the Michigan Bell Telephone Company in aerial cable extensions and repairs in this city, the plans and estimates having been approved by President E. E. Sunny of the company. The contemplated work will include the territory bounded by Rose, Ransom, Porter and Patterson streets, and north of Patterson street to the city limits between West and Walbridge streets. Aerial cable lines will also be placed on South Burdick street, and reconstructive work is planned for various other parts of the city. The work is necessitated by the congested condition of lines in several districts and to provide for increasing demands for telephone service.